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THE MONIST

IMMANUEL KANT[1] (1724-1924)

AS WE view Kant in lengthening perspective, we realize increasingly that, to do him bare justice, a large and crowded canvas would be necessary. Accordingly, you must recollect that my little effort now cannot amount to more than a thin outline-sketch. In particular, I shall make no attempt even to indicate the nature of the controversies to which the Critical Philosophy has given rise. Moreover, I am bound to suppress the elaborate technique so developed by special students that, possibly Aristotle aside, no parallel exists,—and Aristotle has been dead two thousand two hundred and forty-six years, Kant but one hundred and twenty. In the brief period between the publication of the *Critique of Pure Reason* and the death of its author—twenty-three years—more than three thousand works appeared dealing with the new departure; since then it has been commentated as no other. Suffice it to say that, thanks to historical circumstances, no thinker seized such a "psychological moment," setting out from one world, as it were, and mediating the transition to another, wherein we still live. Recalling these unique conditions, then, pray have regard to the strait limits placed upon me this evening. Observing this self-denying ordinance, I shall relate (I) some salient features of the life; (II) I shall draw your attention to the cultural background; (III) I shall review the years of apprenticeship known as the precritical

[1] An address in celebration of the bicentennial of the birth, read before the Research Club of the University of Michigan, April 23, 1924.

period; (IV) I shall then attempt the impossible—a *brief* statement of what Kant understood by "criticism"; and (V) I shall conclude with a bird's-eye view of Kant's influence.

I

The conflict with the Berlin censor aside (1794), Kant's life was devoid of public interest, partly by his own choice. Even before he became so eminent as to have made that "intellectual Siberia," Königsberg, the most famous university in Germany, he rejected offers of promotion and, later, the titles the administration of Frederick the Great would have been glad to confer. Like Professor Melancthon of Wittenberg, and Professor Christian Wolff of Halle (his most influential immediate predecessor in philosophy), he sprang (April 22, 1724) from humble folk. His father followed one of the leather-working trades, did "not taste many joys in this life," to quote the son's phrase, and died (1746) leaving too little to pay for even a burial service. The mother, Anna Reuter, who died when Kant was thirteen, appears to have been the stronger character,—a woman of real natural ability, of great heart, and of a religious faith sane enough to be maintained without flaccid sentimentality, as her son testifies. Both belonged to the Pietist group, and there can be no doubt that this affiliation had much to do with Kant's access to a career as well as with his ethical views. F. A. Schultz (1692-1763), who migrated from Halle to Königsberg in 1731, reinforced the Pietist tendency imported by Lysius (1709) and Lilienthal (1713). Trained under A. H. Francke and Christian Wolff, he combined the religious fervor of the one with the knowledge of the other; he also combined many offices—pastor of the church attended by Kant's par-

ents, professor in the University, overseer of the *Collegium* or high school, and Consistorial Councillor. Kant entered the *Collegium* in 1732, and it seems certain that his continuance beyond the elementary stages was due to Schultz' interest,—perhaps financial aid,—and to the mother's wisdom. Here he remained for eight years, matriculating in the University in 1740. His age, sixteen, intimates what the Philosophical Faculty then was—a school preparatory to the professional faculties. We know little in detail of the *Lehrjahre*. Assuredly, the Pietist atmosphere affected him; more to the point, he obtained a useful hold on Latin, which he spoke and wrote well, thanks to Heydenreich, "an elegant scholar," as he says. Association with some abler undergraduates left its mark. Ruhnken (afterwards professor at Leyden, one of the foremost classical scholars of his day), Cunde (who became Rector of the Latin School at Rastenberg), and Kypke (later Professor at Königsberg), deserve special mention. But the real formative power was Martin Knutzen (1715-51), by all accounts an unusual man: a teacher of tireless activity, an eclectic polymath who professed the several philosophical disciplines and, more important for Kant, the mathematico-physical sciences as then known, with persuasive vitality. He took the youngster by the hand, gave him his groundwork in the ideas of Leibniz, Newton and Wolff, so orienting him that mathematico-physical science remained his chief pre-occupation through some twenty years. In a word, Pietism despite, Kant literally soaked up the "natural philosophy" of the age, and in the setting of the *Aufklärung*.

He remained in Königsberg till 1746 when, orphaned and without place or prospects, he sought a livelihood as resident tutor in the families of the East Prussian clergy and landed nobility, among whom he sojourned for nine years. The job was humble enough, nay, little better than menial. But it afforded two advantages. On the one hand,

it rendered travel necessary; and Kant's journey to Judisch, near Gumbinnen on the Russian frontier, about sixty miles east of Königsberg, marked the farthest range of his wanderings throughout life. Then, too, at the Arnsdorf estate in the lake district of Elbing, he came into contact with "polite society," an apprenticeship rounded out later under the guidance of Countess Keyserling, whose kinsman, it is interesting to note, holds a prominent place among German thinkers today. This experience fitted him socially for the rôle he was destined to play as an academic official.

He returned to Königsberg in 1755. Thus his birthplace was to be his home also for seventy-one of his eighty years. Accordingly, it is essential to recall that, like many small towns in pre-Bismarckian Germany, Königsberg possessed a culture of its own. It was the principal port of entry for North-German countries, the home of a cosmopolitan population, the seat of the ecclesiastical, military and legal administration of the Province. It therefore furnished stimulating intercourse with people of various interests. It is not surprising, then, that Kant's knowledge of British thought, especially of Hume, so important for his mental development, was one consequence of the local situation. His intimate friends, the Englishmen, Green and Mothersill, and the Scot, Hay, cultivated professional or business residents, brought him into contact with a larger world; and the same thing happened along other lines, thanks to his own acuteness and ability to seize suggestions. Indeed, he remarked the social and intellectual advantages of Königsberg with sober appreciation.

On return from the several tutorships, he "habilitated" as *Docent* in 1755. Within a few months, the Seven Years' War burst upon East Prussia, and the occupation of the city by a Russian garrison brought the young lecturer a welcome means of supplementing his scant income; he be-

came a favorite with the officers, who frequented his classroom regularly. Herder testifying, we know that he was an excellent lecturer, full of worldly wisdom enlivened with flashes of humor. But, the poverty of the University—of which he complained bitterly—and the routine of promotion kept him a *Docent* for sixteen years. It is true that, by a piece of monstrous irony, he was offered the Professorship of Poetry in 1766—and had the good sense to refuse. At last, in 1770, he became *Ordinarius* in Logic and Metaphysics and, according to European custom, "read" himself into his chair with the famous *Dissertation Concerning the Form and Principles of the Sensible and Intelligible Worlds.*

He was now forty-six and had published twenty-two books, pamphlets and papers. With this fertile record behind him, it might have been expected that the masterpiece would appear ere long; indeed, in February, 1772, Kant thought so himself, using the phrase "Critique of Pure Reason" for the first time in the crucial letter to his old pupil, the physician, Herz. He was too optimistic. As the letter to Moses Mendelssohn, of August, 1783, bears, the *Critique* cost twelve years' labor, but was written "within four or five months, the greatest attention being paid to the substance, but less regard being had for the form and for the interests of readers who would understand it easily." Would that the former clause had been true! Small wonder, then, that the book bred misconceptions which incensed Kant, and brought the explanatory *Prolegomena to Every Future Metaphysic* in 1783, and the second, revised edition of the *Critique* in 1787, which was reprinted till the seventh edition of 1828.

Thereafter, we have the long array of applications of the Critical Philosophy to ethics, aesthetics, religion and theology, politics and law—all accompanied by controversies and enthusiasms that shook or transformed the Ger-

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man universities, and made the author the most conspicuous intellectual figure of the time. From 1789 we begin to detect the effects of the tremendous toil and, a decade later, Kant being seventy-five, the machine, never any too strong, refuses work. In September, 1798, Kant writes to his old friend Garve, "I am incapacitated for intellectual labor, though in fairly good bodily health. . . . The demands of reason . . . are not abated. . . . But the satisfaction of these demands is most painfully postponed either by the complete paralysis, or at least constantly disturbing inhibitions of my vital force." The last five years were pitiful. The lonely bachelor, beset by suffering and debility, fell upon second childhood. Death, 12th February, 1804, came as a merciful release.

II

It demands real effort to reconstruct the intellectual perspective of Kant's time; yet, unless we are prepared to face the effort, we cannot but miss much. To begin with, we must set aside the "modern" era so-called, the era heralded by the writings of Rousseau, James Watt's steam engine, Adam Smith's *Wealth of Nations*, the Declaration of Independence, Kant's *Critique of Pure Reason*, and the French Revolution. The century and a half intervening between us and them has seen changes more startling than those which occurred in the preceding millennium. Knowledge, society, and man's relation to the forces of nature have undergone profoud transformation.

Reverting to the fifteenth century, we find that an epoch of ferment has begun. After Marco Polo (1215), "the Herodotus of the Middle Ages," conventional geography met constant jolts. The "circumnavigators," Raleigh in Virginia (1584) bringing up their rear, unveiled a new

world, mysterious and beckoning. Between Lorenzo Valla (1440) and Bruno (1584), Nature presented itself as the great mystery challenging attention, no longer to be shunned because the happy-hunting-ground of the devil and his myrmidons. Reinforcing these tendencies, so subversive of customary views, came the cosmographic discoveries of Copernicus, Galileo, and Kepler; destined to further elaboration by logarithms, analytic geometry, and the calculus. Meanwhile, the long movement culminating in Boehme (1615) sought religion in self-knowledge, not in church or creed. The scepticism of Montaigne aside, this "inwardness" coincided with the basal ideas of the Reformers. Taken together, these events portended extensive revision of man's conceptions of his world and of himself. Consequently, politics, ethics, theology, religious organization, science, and philosophy moved toward new horizons in the sixteenth and seventeenth centuries. As a result, a dogmatic rationalism arose to furnish an alternative to a dogmatic supernaturalism. The swing toward replacement of the one scale of values by the other may be said to have reached its height at the moment when Kant matriculated at the University and Frederick the Great ascended the throne (1740). So far, so good.

But, despite the naturalistic drift of the Renaissance, European civilization had tended for centuries to restrict intellectual activity, if not to religious orders, then to those with whom the Church and the theological angle of approach were exceedingly potent. This tradition, reinvigorated as it was by the Reformation, remained so powerful that the successors of the Italian naturists could not choose but think in terms of it. One conspicuous instance may serve to point the moral. As everyone ought to remember, Newton may have abhorred the methods of scholasticism; nevertheless, he acquired theology enough before 1690 to veer toward the doctrines of Arianism, and was

so interested in "Bible-study" that he wrote four theological works, besides the letters to Bentley on the proofs of the being of God and "many divinity pamphlets."

But, whatever the power of compromise or obscurantism, thought *was* in process of liberation; given the Renaissance and Reformation as background, Reason was bound to realize fresh supremacy, despite that "Greece had risen from the dead with the New Testament in her hand." So, the theory of "natural theology" and the theory of "natural philosophy" came to divide the empire of intellect. Each influenced the other in many subtle ways. But,—and this is the important matter,—both participated in the conspiracy to postpone the profounder question of unity. For, they shared substantial, if naive, confidence in the valid function of abstract Reason.

The synthesis for this period, so far as its ideas were ever integrated in a single whole, stands to the credit of that Admirable Crichton, Leibniz, the modern Aristotle. Had circumstances and temperament permitted him to concentrate, there is no telling what he might have achieved. As it was, with every drawback, he possessed a spaciousness, and a thrust of suggestive imagination, quite beyond the ken of his disciples. His cardinal doctrine, that nothing happens without sufficient reason, was the result of a valiant attempt to transcend the banalities of "design" and the acosmism of Spinoza. Thus he says: "It is clear that the harmony of so many beings which exert no mutual influence upon each other, can spring only from a general cause which directs all things, and which must combine infinite power and wisdom in itself to predetermine their harmonious orders." It follows that the "general cause" and the universe are quite separate; so much is laid bare by "Natural Reason." Implicitly, then, human experience *can* distinguish what is against Reason from what is above Reason. Place this distinction in the forefront, then pro-

ceed to exhibit the "general cause" in occurrences so trivial that all can see at a glance, and you have the *Aufklärung* into which Kant was born. To be more specific: Reason reported what was immediately under the eye, as it were. Thus, philosophy became a "non-technical, non-speculative theory of *human* adjustment to this world," and, when formulated in terms of eudaemonism, had the merit of instant intelligibility. The very depths of bathos were sounded by a whole school of pygmies who spawned "physical and moral contemplations on the three kingdoms of nature." In sum, God runs the world on behalf of the happiness and virtue of His *rational* creatures. Kant struck in when things had reached this sorry pass. As Wolff said: "God can cause the sun to stand still, but He cannot change the ratio of the diameter to the circumference of a circle." Plainly, following Leibniz, Wolff allowed an important place to "naturalism." As plainly, given the infiltration of Newton, coming to Kant by way of Knutzen and Teske, the sun's stoppage was bound to be eclipsed by practicabilities such as those indicated in the determinate characters of the circle. The mask was about to be torn from pedantic Rationalism.

Although he did not recognize it at the moment, Kant was confronted by the age-old problem which has always puzzled, and is always likely to puzzle, first-rate minds. Let us describe it summarily thus: There seems to be one order prevalent in Nature; but self-consciousness demands another order, pointing beyond, yet *not disturbing,* Nature. Now, it is quite significant that the first-rate minds of this period—Hobbes, Spinoza, Leibniz, for example—accept a mechanical system of the physical universe without parley. But Leibniz, at least, was driven to assume two principles, and then to attempt to unite them in deity. The *Théodicée,* his feeblest book, set this fashion, unfortunately. The result was that Wolff, while admitting the "mechanical

connection" between "corpuscles" (the phenomena of bodies, we would term them), denied that their derivation from "ultimate or simple substances" could be explained mechanically. This rendered the analogy from the machine imperative. *A priori* ends in Nature, as in tools, alone could explain this "derivation." Purposiveness, or production of an advantage,—specifically, "the happiness of mankind,"—offered the clue. Of course, these "unconditional ends" rendered Nature contingent so far, and therefore there was opportunity, if occasion arose, for the intervention of miracle. God is limited by the finite nature of His creation—mechanical "forces" *are* unalterable means; in the metaphysical realm, He is free—He can do what He will with ends. But, under the *Aufklärung* the latter fell into *Nutzlichkeitskrämerei;* whereas, under Newton, the former grew from strength to strength. Small wonder, then, that the youthful Kant turned to the "perfection" of the mathematico-physical universe and, tolerating current ethical utilities, postponed the ultimate problem for more than a quarter of a century.

III

No direct evidence is available concerning Kant's inner mental development. Many accounts have been given, based upon inferences from his published works and other remains. Simplifying these as far as possible, it may be said that three stages emerge. *First,* from 1746-1758 or thereby, when contributions to natural science are in the ascendant. *Second,* the phase of the sixties, when eclecticism gives way before a certain scepticism. *Third,* the growth of the Critical Philosophy in its various aspects, beginning, say, about 1769. These can not be cut off from each other with a hatchet; yet they differ sufficiently to be separable, all things considered.

(1) Kant's traffic with the natural science of the day culminated in the *Universal Natural History and Theory of the Heavens; or an Essay on the Constitution and Mechanical Origin of the whole Universe, Treated according to Newton's Principles* (1755), a work which like Hume's, fell still-born from the press and, thanks to the destruction of the sheets, never gained wide circulation. It was not till 1851, in Schopenhauer's *Parerga und Paralipomena,* that Kant's priority to Laplace was recognized definitely. Huxley first drew the attention of the English world to it (1869), remarking that the work is "seemingly little known." Only in 1886, with the treatise of Wolf, the Parisian astronomer, did the affair reach the attractive stage of international controversy.

Thanks largely to Kant's own attitude, there has been a distinct temptation—many histories of philosophy succumb—to treat his predecessor Wolff as a scholastic or even pedant. No doubt, when he made "laws of nature" secondary to the "unconditional" laws of Non-contradiction and Sufficient Reason, he followed the simpler method of external "adjustment," and evaded the real problem more or less unconsciously. Feeling this, Kant was influenced by the opposition between rational "necessity" and a "natural contingency" which seemed altogether determinate. In any case, Newton had contrived a veritable synthesis of scattered phenomena, while Wolff had come far short. Accordingly, in the *first* stage, we find the "naturalistic" ideal predominant. Briefly, Kant would universalize *verae causae,* giving them a wider application than Newton dared; that is to say, he extended their operation beyond the solar system to the "infinite" stellar universe. The quite remarkable Preface (which I beg you to read as much for its patness to present "fundamentalist" controversies as for itself) states Kant's position with luminous directness: "I seek to evolve the present state of the uni-

verse from the simplest condition of nature by means of mechanical laws alone."

Time fails me for further pursuit of Kant's "voyage of discovery" in natural science, which I have tried to chart elsewhere. I think you will find some surprising things if you refer to *Ueber die Natur der Cometen* (1872), by that queer genius Johann Zöllner. It is of slight importance, I think, as between Laplace and Kant, that the "original" nebula of the one was "a true atmosphere," of the other a Lucretian assemblage of particles. What does count is Kant's decisive restriction of "effects" to physical "causes," and his consequent statement of evolution: summarily, "the *cosmic* evolution of nature is continued in the historic development of humanity, and completed in the moral perfection of the individual." A dynamic universe has been substituted for a static.

In that day, many things now known to babes and sucklings were hidden from the wisest. For example, what recourse had a speculative, or even mathematical, physicist in default of thermodynamics? And so it is not wonderful that Kant betook himself to theories (in the Third Book) involving, as he says, "something more than what is merely arbitrary, although always something less than the indubitable." Listen to this:

"The rational beings, whose place of generation and abode is found nearer the centre of the creation, are plunged in a rigid and immobile kind of matter which holds their powers shut up in insuperable inertness. . . . On the other hand, with the various distances from the universal centre, this perfection of the world of spirits, which rests on their altered dependence on matter, will grow up like an extended ladder."

In effect, this implies that Kant's universalization of mechanism was feasible because, thanks to inherited background, he saw no issue between *this* "naturalism" and re-

ligion. The reciprocity characteristic of the causal universe roots in a "ground" and, the more one knows "laws of nature," the farther he extends their operation, the more this "ground" stands revealed. As the *Monadologia Physica* (1756) bears, Kant was at home in this inherited solution till 1763, when he summarized *The Theory of the Heavens* in the "Cosmogony" prefixed to *The Sole Possible Argument for a Demonstration of the Existence of God.*

(2) In the *second* phase, which culminated in his most amusing, ironical and, perhaps, best written book, *Träume eines Geistersehers, erläutert durch Träume der Metaphysik* (1766), the lighter, almost cynical mood of the eighteenth century overtook him. Voltaire is abroad. The subreptiveness of certain concepts—"spirit" and "cause," for instance—plagues him; elusive factors steal upon thought surreptitiously, and so—"metaphysics . . . is a science which has not yet come into existence," as he declares. Some questions may prove beyond our ability, owing to "mental parallax." For the rest, "surely, the heart of man contains in it immediate moral prescriptions." When Kant was writing the half dozen tractates of 1762-66, where the shadow of scepticism falls deepest, he had been reading Rousseau with huge gusto. He had wooed thought and, rejected, proceeded to dally for a moment with romantic obscurantism.

In the Stoa Kantiana on the north side of the Königsberg *Dom,* where Kant was laid, we read those words: "The starry heavens above me, and the moral law within me." Properly understood, they intimate the change now at work in the philosopher's mind. He was coming to see that a purely cosmological theory can never box the compass of human experience. A cosmology—and the better it serves, the truer this is—leads beyond itself. Humanity requires some vision to assuage its craving. Realizing this, Kant was about to introduce a conception which, more than

anything else, perhaps, has differentiated profoundly between German thought on the one hand, French and "Anglo-Saxon" on the other. He was on the point of passage from *Scientia* to *Wissenschaft*. According to Anglo-French usage, *Scientia* indicates things, and a body of truth, "objective" in the sense that they are out of relation to consciousness. *Wissenschaft,* on the contrary, implies a mental act as well as a body of truth, and intimates that both are conditioned by knowledge.

Notwithstanding the patient and minute research of many scholars, who have contributed so richly to "Kant philology," the crucial decade of the sixties remains dubious in important respects. The precise time and strength of the influence exerted by Hume are not clear; some minimize, some exaggerate the inbreak of Rousseau; Swedenborgians have fathered far-fetched suggestions; the recurrence to the Wolffian tradition is hard to estimate, like the throb of Leibnizian mysticism. However, there can be no doubt about one thing: the "man-of-the-world" attitude, attested by the easy flow of some "pre-critical" writings, the *Dreams* most conspicuously, abates. "The Labour of the Notion," as Hegel was to call it later, told its tale, or, in Windelband's happy phrase, "Minerva scared away the Graces." Although we may be in no position to trace the tortuous paths whereby he reached it, Kant was on the verge of the "Copernican discovery," as he characterized it afterwards. A famous phrase! How shall we interpret it?

Centuries ere Copernicus, ancient cosmologists — the Pythagoreans, among others, if I mistake not—had inferred that the place of their habitation, even if sense evidenced its flatness, *must* "rest" upon a sphere. Already, thought was insisting that things *are* not what sense makes them *seem*. But, appearance was to occlude reality till Copernicus proved the dual motion of the earth-sphere.

Nevertheless, although he thus substituted the heliocentric for the geocentric outlook, the "earth-bound" framework of space and time still held men fast prisoned. "Matter" and "motion" may be "unlimited" in space and time; they are *"in"* space and time for all that, because these remain "presuppositions," to adopt Newton's view. To this extent, then, the geocentric outlook was *not* done away. For, why attribute the *local* significance of these conditions to the universe as a whole? So far as I am capable of understanding him, this is precisely the question raised by Einstein. Thus, whether, with Ptolemy, we place man on the earth, or with Copernicus, on the sun, the problem of the coefficients of human mental perspective stands as it was. The *Critique of Pure Reason* became the Domesday Book of modern thought because it forced this issue.

In the covering letter, sent to Lambert with a copy of the Inaugural Dissertation (1770), Kant says: "About a year ago, I reached a point of view which, as I flatter myself, I do not require ever to change, though of course it needs to be extended. By its means, all kinds of metaphysical questions can be tested, and, so far as they are answerable, can be decided." What did he imply? His own words furnish a very decisive answer. "I found that many of the axioms which we have regarded as objective are, as a matter of fact, subjective: that is, they express the conditions under which alone we are able to apprehend or understand the object." When one recalls that "necessity," "cause," "substance," "reality," and "possibility" are among these "axioms," the subversive nature of the suggestion strikes home. Hence, I have been bold to call it "Kant's philosophical revolution." We shall try to estimate it, by way of conclusion.

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IV

(3) Risking distortion of focus, I must state the Critical Philosophy starkly, stripping it of all *nuances*. It helps us to catch Kant's line of approach if we recollect that human knowledge may, indeed does, habituate itself to one kind of system rather than another. To use a phrase from logic, "the universe of discourse" is by no means invariable. For example, it were superfluous to labor the idea that a geometrical, or a chemical, or a biological, or an historical system reverts to concepts of its own; that the two former evince mutual relations not shared with the two latter, and *vice versa*. Accordingly, it is possible, perhaps inevitable, that attempts to interpret *our* universe should be dominated by groups of distinctive categories (or modes of formative synthesis) which, as it were, give a twist to the framework wherein results are organized rationally. Now, in his theoretical philosophy, Kant set out from the Newtonian view of the universe. That is to say, he was habituated to a specific angle of approach. Further, to grasp his situation, one must insist that we can reproduce it today only with difficulty, if at all. Take it negatively, to begin with. From our contemporary standpoint, it is nothing less than startling to discover that, in such representative works as Whewell's *History* and *Philosophy of the Inductive Sciences*, practically no awareness is shown of the conservation of energy, of the mechanical theory of heat and the kinetic theory of gases, of absolute measurements and absolute temperature, of the cellular constitution of plants and animals, of variation in relation to species, or of the evolution of organisms. So powerful did the Newtonian outlook remain that this is

true not merely for the *History of the Inductive Sciences* of 1830, but also even for the later revision of the *Philosophy,* in 1858 and 1860. Next, taking the matter positively, remember that you must go behind Whewell a whole century! Doubtless, previsions of modern dynamism can be found,—Heraclitus had them,—but the prevalent perspective differs from our's radically, and the last thirty years have made the gulf deeper than ever.

The *Principia,* as I understand it, defines "force," "mass," "distance," and in such a manner that methods of quantitative measurement can be employed confidently. In short, availing mathematical *formulae* furnish instruments of analysis, algebraic processes can be followed which, again, can be referred to geometrical figures. Now whatever our results, this means that we *do* start with a universe definitely arranged one way rather than another, and that the inferences presuppose just this arrangement. To wit: "things" stand alongside each other "in" space, alter their spatial relations "in" time and, given such self-contained wholes "endowed with gravitation and inertia," we can forecast their interconnection with accuracy sufficient to rely upon the results implicitly. I suppress all the problems lurking here. Suffice it to assert that, on the theoretical side, Kant never escaped this "universe." True, given the outlook, he "proves" that the framework—space, time, cause and the rest—cannot be explained without reference to the interference of *our* understanding. "Till now it was taken for granted that our understanding must accommodate itself to the objects; but all attempts to learn anything which might widen our knowledge by *a priori* conceptions were without result in consequence of that presupposition. Let us try, therefore, whether we do not come nearer to the solution of metaphysical problems by supposing that objects must accommodate themselves to our understanding." In the realm of sensuous experience,

with which science deals, material is somehow imparted to us by the senses, from a veiled source alongside of us. But, the "universality" and "necessity" inseparable from science cannot be extracted from sense. Therefore, they must be added *formally* by our minds to the *matter* supplied by the senses. But, if this be so, what then?

Recollecting that the conclusions hold for intellect alone, we are left with three factors: (1) Sensations as perceived by individuals in conscious states; (2) the *mundus sensibilis,* that is, possible phenomena in their sum-total as they occur or "exist" under conditions of human percipience; (3) the *mundus intelligibilis,* that is, "objects," or the sources of sensation, as they exist in themselves, and Ideas of universal relations as framed by Reason. The last would include any order of the universe which we feel bound to maintain as absolutely valid. Obviously, the *first* may vary from individual to individual—as between an animal and a man, for example; the *second* preserve continuity for all who experience them by instrumentality of the same organization,—hence the possibility of science; the *third,* while thinkable as "regulative" of an intelligible experience, present no objective reference, for, such could be compassed only by an absolute intelligence. Consequently, Understanding is objective because, by means of intuition and judgment, it synthetizes the *uniform* "manifold of sensation" into system and, in so doing, adjudges itself one among the members of this system governed by "natural law." Beyond this, rational knowledge halts; for, objects devoid of sense-reference, even if given in conceptual processes, are *praeter*-human. The outcome is that, although *Verstand* can contrive *formulae* expressing relations in terms of measurable quantity, "primordial laws" lie beyond its competence. The elaborate machinery of the *Critique of Pure Reason* is designed to exhibit the connection between percepts and concepts; for the rest, we are

left with agnostic conclusions. The "objects" of the old metaphysic—the soul, the world as a whole, and God—are outside the grasp of Understanding, because they are devoid of sensuous content. So, together with *das Ding-an-sich,* they constitute the Great Perhaps. As "transcendental object," and as "Ideas of Reason" they indeed form effective components of experience, but, in the empirical realm evoked out of sensation, nothing existent corresponds to them. Still, we must have a care to note that they are deflated, not expelled. Reason does present a conceptual system, exempt from the "necessity" of causal determination; and this remains to be dealt with.

It would appear, then, that man leads a double life, sensuous and necessitated in one aspect, ideal and free in another. The difficulty of divining Kant's precise intent here is enhanced by the circumstance that he never rounded out his philosophy. Critically, we know pretty well where we are; constructively, we are somewhat in the dark, because but one of the indispensable metaphysical treatises was completed—*Elements of Natural Science.* Accordingly, the constructions deal mainly with aspects of experience where practical or moral norms rule, somewhat to the exclusion of theoretical or logical. To quote his own phrases, Kant confines himself to "the doctrine of practical wisdom as a *transition* to the *final* goal of metaphysics." Although the *mundus intelligibilis* considered as an object of perception is a "mere undetermined idea," yet, "as an object of practical relations of one intelligence to intelligences of the world in general, and to God as a practical first principle, it is a true concept and definite idea: *civitas Dei.*" While science deals unescapably with the immanent, this points to the transcendent. So we may take Kant literally when he characterizes his thought as "the proper apology for Leibniz." In short, he never dismissed the Leibniz-Newton perspective. Reason compels us to infer that

the "monads" related to each other causally form a secondary system which, in turn, depends upon a primary *nexus* for its rational (or "understandable") "composition." The fact is, Kant held this view throughout his intellectual life. Its implications are: that bodies exist for percipients; that they are, and cannot but be, referred to "things-in-themselves" for their ground, to the Ideas of Reason for their universal interpretation; and that these concepts, while without perceptual relations, are imposed by Reason unavoidably. Sense-objects are appearances, except in so far as they are referred to a *mundus intelligibilis* furnishing heuristic principles. Kant tackled this problem for the moral realm, not for the intellectual.

Manifestly, it was a great gain for naturalists to learn that qualities—color, motion, weight, and so forth—do not attach to an occult substance. As manifestly, it was a great gain for humanists to have flung at them that the concept "God" helps not at all in mechanics; that the idea of the world as a whole avails nothing in biology; that the notion of a free soul is likely to work havoc in economic history. Similarly, it was a great gain for naturalists to be reminded forcibly that all science is *widersinnisch*, preposterous, because an outcome of reflection, not an inflow through sense; and for theologians to be told rudely that their proofs of the being of God put the cart before the horse. Unfortunately, Kant never elaborated the consequences "in one piece" for experience as a whole. We must be content to take them as we find them in the moral dimension.

The Critical Philosophy were better described as a series of cyclopean fragments than as a system; and the reason is not far to seek. Kant was the subject of two coercive loyalties. On the one hand, he championed what he held to be verifiable truth as against the admixture of dogma with science popular in his day. "The appeal to supernat-

ural influences is the refuge of a sluggard philosophy." On the other hand, and perhaps more fervently, he held profound convictions about a moral order under the law of duty,—imbibed with his mother's milk, as we saw. Hence a difficulty. The former, pursue it with what single eye one may, cannot satisfy the yearning of humanity. For, as the Third Antinomy bears, man in the sphere of causally determined phenomena is just as necessitated as all else. But, this realm of necessity, as *we know* it, is compounded of two elements: a sensuous matter that varies unceasingly, and a group of invariable relating (or "synthetic") factors. Thus, consciousness as active furnishes *some* conditions of its own possibility. We find *that* this is so; *how* it is so we do not know. In effect, then, we envisage Nature with a completeness denied us in the case of our own consciousness. Yet, almost for this very reason, consciousness, in the moral realm, becomes the revealer of values with which Nature cannot interfere. For, unlike animals, men enjoy "apperception" in addition to "apprehensions," and can, "therefore, make their representations universal." But, seeing that the conditions which govern empirical experience govern the Self also, the "universalizing" can attain completion only in the moral sphere. As moral, never as intellectual, man *serves himself* a perdurable person. Thus, there remains an irreducible conflict between the "ideal" of science,—the "reign of law,"—and the "ideal" of humanity,—moral freedom as the means to perfection. Or, putting it otherwise: the "transcendental self" has no content of its own in the dimension of Nature, in the dimension of morality it *postulates* its own content. I am well aware of the temptation to stress Kant's view of the Self as *ursprünglich*. I judge that we keep nearer his temper and that of his time, if we affirm merely the *de facto* presuppositions of the moral law. Bluntly, the fact that, in conduct, self is purposive, unveils the source of moral

sanctions. We cannot anticipate that we shall ever compass the conditions which bestow actuality upon the spiritual life; at the same time, it is of record that the self does generate values independent of local and temporary situations. Where we frankly recognize our ignorance, there we *do* interpret in terms of "spiritual experience." The veritably reflective mind sees that we cannot ask more, and refuses to claim more.

Thus, difficult as it is for us to think ourselves into the Kantian background, unprejudiced statement of his entire conclusion is even more difficult. I can attempt nothing more than a general impression.

In the *Critique of Pure Reason,* Kant was so intent upon determining the scope of sensuous knowledge—and he admitted none other—as operative within the Newtonian or mathematico-physical universe, that he laid little or no emphasis upon the profound inferences he afterwards drew from the moral, aesthetic, and religious consciousness. Nay, a main obstacle to a grasp of his *entire* drift has been precisely his failure to prepare readers for what, on this very account, seemed to be a repudiation of critical agnosticism. Nevertheless, when he asserted, in the First Edition of the *Critique,* that Reason is above sensuous conditions, and therefore non-phenomenal, he was already committed to the doctrine that human experience extends beyond the scientific knowledge he was discussing there. Newtonianism is vindicated completely within its field of application, because knowledge is limited by the perceptual factor which makes it possible. On the other hand, this does not imply that Reason is limited in itself,—just the reverse. For, in proportion as he restricts the scope of knowledge, Kant widens that of morals and faith. Reason becomes the source of an ideal *Weltordnung* more fundamental than the natural, one in which, as subjects of rational insight, we are partakers. "From the very outset, man knows him-

self not simply as one among many, but as a member of a series of developments of his own being." This is an original, unassailable fact. Hence, while in the *Critique of Pure Reason* we have a rigidly insinuating analysis of a complex situation, in the moral and religious works one or two principles are stated, and the central conclusion drawn with dogmatic distinctness. So, thanks to Kant's jerky method, the two universes may seem to be isolated, or to lie side by side out of relation. But it never occurred to him to imply that either *can* leave the other unaffected. For example: a scientific proof of Deity is out of the question; but, by the same sign, a scientific disproof of Deity is equally out of the question. The presuppositions of the moral consciousness,—immortality, freedom, and God,—once recognized as necessary postulates, become objective, because indispensable in a universe where the moral law is capable of realization. After all, the problems of existence and of value are inseparable. Kant's sceptical logic and his *doctrinaire* ethics unquestionably conceal this, his invariable view. To adopt a theological phrase, he always held that the human spirit witnesses to the operation of "prevenient grace." "The principle of morality, just on account of the universality of the legislation . . . is . . . not limited to men only, but applies to all finite beings that possess Reason and Will; nay, it even includes the Infinite Being as the Supreme Intelligence." Paradoxically, Kant's manifold influence may be traced to his strange combination of intellectual uncertainty with moral conviction.

V

After the ferment of the Renaissance-Reformation period, modern philosophy began to be formulated some one hundred and fifty years before the *Critique of Pure*

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Reason; we may take Descartes' *Discours de la Méthode* (1637) as the significant date. Minor eddies aside, two main currents flowed through the seventeenth and eighteenth centuries. One, chiefly British, runs in the direction of Positivist empiricism, though with certain quasi-theological tendencies, which Locke and the Deists represented. If there be a "Whig idea" in philosophy, as in politics, here it is! The other, of continental nativity, heads toward a Rationalism which is profoundly affected by the mathematico-physical knowledge of Descartes and Leibniz. Spinoza apart—and he did not come to his own ere the Romantics,—it culminates in a dualism impossible to transcend save by "the immediate concourse of God." In both, then, the theological outlook, dominant since Augustine and Erigena, preserves vitality. Neither school had been able to drive its rival from the field; hence the common theological factor played a great part. Kant's immense influence is due to his double-refraction process—passing one view through the other, with serious effort to do justice to both. For this reason, modern thought, as we understand it, dates from him.

On the whole, he was lucky in his intellectual contacts. His superficial acquaintance with Spinoza wrought no harm; for, despite Spinoza's manifest superiority as a constructive thinker, his solution of the problem came too soon,—like Hegel's later. Rising above their predecessors and contemporaries, Leibniz for the continentals, Hume for the British, sensed the decisive questions. Kant's work was mediated through them. Indeed, they had so cleared the issue of irrelevant matter that the problem as they left it touched fundamentals in every aspect of human experience,—metaphysical and scientific, ethical, religious, and political. It may be put in the form of an alternative: Either human thought is no more than a "short-hand" interpretation of subjective events, without valid objective

application; or human thought prescribes the principles to which all possible experience must conform. Adopt the former and you land in a Positivistic Naturalism which abandons all profounder issues to mystagogues; adopt the latter, and somehow, by reference to intellect or to will, you have the problem of the universe on your hands, in the sense, too, that human insight uncovers possibilities which, as yet, lie beyond explicit determination by a developing experience. Kant faced the music, asking himself: How far can the Leibnizian doctrine of the primacy of Judgment be maintained after allowing every legitimate concession to Hume's case for sense-perception? Perceptual propositions contain a definite content, no more. But there are seminal judgments which evince wonderful capacity for self-evolution, providing inner meanings predicable of all sorts of events having no immediate relation to them. Are the former alone "true"? Are the latter alone capable of accounting for the construction which we *do* find in our common experience, notably in physical science and in morals? Kant approached these alternatives in a new fashion, by expelling the question of "objects" and concentrating upon the *de facto* organization of experience. The result was—*not* compromise, but a scale of values such as nobody had applied before. His Pure Reason, which cannot guarantee objective knowledge, nevertheless originates "possibilities" demanding a system of rational principles. These principles are completely valid for the moral consciousness, even if, otherwise, their *system* must remain relative within our sensuous life.

Kant did not escape his time; only transcendent genius, blowing where it listeth, can work this miracle. But, whenever sapping and mining are undertaken, we come upon the results of his patient, courageous toil. From Reinhold (1787), through Maimon (1790), Fichte (1795), Schelling (1800), Fries (1803), Krause (1804), Hegel (1812),

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Schopenhauer (1819), Herbart (1828), and Beneke (1832), he seems to undergo eclipse. Yet, without him, their issues had not been set; even Schopenhauer and Herbart proclaim themselves the sole true "Kantians." Between 1840 and 1865, the doldrums of nineteenth-century thought, the popular metaphysics of Materialism, and the feast of fat things spread by the rising Human Sciences, threw him in shadow. Thereafter, till the end of the century, he occupies the centre of the stage. Neo-Kantianism in Germany, Neo-Criticism in France, Criticism in Italy, the Idealistic School in Great Britain and the United States and the phases of international Positivism, conspire to magnify this or that strain among his manifold suggestions. During the present century, the prophet of Pragmatism harks back to him through the medium of Renouvier; even Psychologism and Voluntarism entertain more than a suspicion that his doctrine of the "inner sense" may be worth revival, or that the *Practical Reason* may embody imperative truth. Theologians, puzzled or overset by Naturalism, find heartening in a reinterpretation of his moralism, which would restore God to man as the "Great Companion." Nay, amid the widespread discontent and protest characteristic of thought at this moment, the very opposition to his Rationalism attests his magistral place. In a word, all agree to recognize that he stood at the crossroads, and that, ere choosing the more excellent way, they must return to scan his sign-posts.

R. M. WENLEY.

LAMARCK[1]

HUMAN societies are impelled by a vital necessity to become aware of their own distinctive activities, to create for themselves a mental image of man and the world, and to concentrate all the impressions of life into a mental effort. As these societies are perpetually at work, systems come into being and disappear, traditions grow and are forgotten without anyone paying the least attention; still, while thought is naturally practical, there is nevertheless in it a critical phase inciting it to obtain information about the history of ideas, to estimate the degree of social organization revealed for each system by the degree of organization of concepts, to set forth its claims to permanence or to dissolution. Now, among the great systems of ideas, there are perhaps none that the activity of philosophers and scientists, carried away in the course of a century by divergent preoccupations, has more completely mutilated than the system of Lamarck; there are none in which are found more closely combined the intellectual and sentimental currents of the eighteenth century. For critical thought this is an adequate reason for reinstating its links and connections, its internal economy, its mind.

I. Lamarck

The youngest of a large family, dedicated to an ecclesiastical life, incited by the rebellion of a powerful, sensual, imaginative nature and by a retiring and lonely childhood to break away from family traditions, Lamarck allows his youth to fall under the control of a suspicious and head-

[1] English translation by F. Rothwell.

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strong character, one that was impatient of the slightest curb. He makes his own the life of imagination which develops within him a strange blend of timidity and boldness. He becomes feverishly excited at the prospect of war, dreams of active warfare, and becomes a soldier at the age of seventeen. He has scarcely had time to distinguish himself before peace is declared, bringing with it a garrison life in Provence, where a little music and gardening beguile a state of compulsory inaction. After six years' military service, he is compelled to resign his lieutenancy at the age of twenty-two. Thereupon, too poor to live the life of a nobleman and to uphold his rank without following the only career permitted to his condition, too enterprising to confine himself like Vauvenargues to moral reflections and belles lettres, perhaps also yielding to the need he felt for a life of meditation which will enable him to obtain a hold on things, Lamarck turns in the direction of science. He comes to Paris and enters a banking house as a clerk so that he may be able, a year later, to visit the Ecole de Médecine and the Jardin du Roi.[2]

About the year 1768, the conditions for a study of nature are to be found in these scientific surroundings. By substituting for the religious quarrels which exhaust the strength of the theologians scientific curiosity and a taste for experiment, the Régence liberated nature from the strangle-hold of religious dogmas and metaphysical systems, and gave it back its own distinctive development, activity and spontaneity. The perfection, the definitive character that geometry, physics and astronomy appear to have attained, justify the conviction that only a body of physical explanations can account for the ensemble of nat-

[2] The excellent studies of Packard, *Lamarck the Founder of Evolution* 1901; of Marcel Landrieu, *Lamarck le fondateur du Transformisme*, 1909; of Revault d'Allonnes and of Le Dantec as an introduction to a choice of texts offer bibliographical indications that have been rendered necessary both by reason of the scarcity of Lamarck's works which have never been reprinted—with the exception of the *Philosophie Zoologique* and the *Discours d'Ouverture*—and by omissions in the catalogues of the large libraries.

ural facts. But the popularization of *Newton's Elements of Philosophy* undertaken by Voltaire, the development of the theories of Newton, the application made of them by d'Alembert to the movement of fluids, the controversies on caloric, the discovery of such new physical facts as electricity and magnetism, the multiplicity of observations and collections regarding natural products and customs made in the course of missions and voyages in Africa, Asia and America, the studies in anatomy and physiology—all these reveal the gaps, the apriorism and the excessive simplicity of the mechanistic explanation of the world as offered by Descartes. Nevertheless, the dispersion, the fragmentation and the empiricism which this mass of growing disciplines and new considerations would be calculated to introduce, make one reflect on the necessity of enabling human wisdom to retain its unity, its organic character. This mass of convictions produces the spirit in which the eighteenth century enters upon the study of nature? Whatever be the properties and the qualities of phenomena, there is but one way to account for the effects observable in the various workings of nature, only one method, one system of concepts. And scientists take into account the specificity of facts only the better to bring all the phenomena of nature under the laws of motion.

Indeed, in order to make more tractable the mechanism to which Boerhaave and Borelli subject animal economy, the Jardin du Roi makes its own Stahl's ideas on the instability of organic compounds in presence of the forces of the physical world, the passivity of matter, the power—both creative and conservative—of life which offers an incessant resistance to death. Guardian, however, of the Cartesian tradition handed down by Perrault and Fontenelle, it reacts against the scholastic method of looking upon vital force as one with the soul, and identifies life with organization, with the very functioning of organized matter, so as to be

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able to study it from the physicist point of view. Bernard de Jussieu attempts to substitute consideration of laws for that of genera in a botany that has been handed over to classifiers, whilst Buffon, in language alike remarkably firm and well expressed, states precisely what are the conditions for studying nature. He reminds the naturalist that "experience is the only source of all real science"; that we must at first be content with seeing a great deal that is devoid of plan or design, observing properties and their relations, following the course of nature, investigating the physical causes of effects which it is attempted to explain by excluding all arbitrary connections and all moral considerations. But he also reminds us that we must determine particular effects only in order to "pass from the particular effects to the general effects where we can compare nature with itself in its mighty workings, and whence we can finally open out paths for perfecting the various parts of physics." Reducing the host of beings that are not living bodies to remains of living beings which have been obtained after death by decomposition, he subordinates the study of crude unelaborated bodies to that of organized bodies and sets nature and life in the same category. At the very time when the system of Linnaeus is upholding in science the spirit of theology, Buffon is applying his own object and method to natural history and propounding a host of ideas that possess the importance of a working hypothesis.

Meanwhile scientific investigation becomes enveloped in a more complex atmosphere. The substitution of scientific symbolism for metaphysical symbolism does not come about without a profound repercussion on intelligence and feeling. Philosophers understand that liberation of the intelligence marks a new moment of thought. Whereas the Encyclopedists emphasize the concatenation of the disciplines and lay stress on the social function of science, Con-

dillac undertakes the study of signs, language, analysis, only to lay bare the mode of formation of the concept; he accentuates the psychological and individual elements which form an integral part thereof only in order to define the conditions and the limits of knowledge. Nevertheless, the emotion originally concentrated on intellectual activity changes its object, fixes itself on the spectacle of things and quickly becomes blended with the impression of wonder, admiration and infinitude aroused by the variety, the richness and the inexhaustible fecundity of nature. *Le Poème sur la loi naturelle, l'Interprétation de la Nature, la Profession de Foi du vicaire Savoyard* enable us to follow the genesis of a new feeling which expresses the relations between man and nature, and turns upon the scientific spirit, at the moment of its appearance, only the better to become reconciled with it subsequently. Thus, in the work of science, in which France collaborates with the rest of scientific Europe, the Netherlands, Sweden, England and Austria, France alone possesses intellectual traditions that enable her to acquire a clear and complete awareness of the conditions of scientific knowledge and to find the ultimate rationality of her discoveries in a philosophy of the sciences. It is owing to her state of concentration, her sociability, her high degree of civilization, that France fully sees and understands that speculation born of action returns to action.

And Lamarck, in whom emotion and imagination are very powerful, communicates with the youth of his generation in a passion of mental activity, he shares their enthusiasm, and, like them, falls under the sway of Jean-Jacques, Condillac and Buffon. He also brings into his investigations a turn of mind whose originality was respected by the pliant and liberal teaching of the Jesuits of Amiens. The impressions left in him by concrete reality are profound enough to paralyze all attempt at reaction and to

win attention without permitting him to catch himself up, so to speak. His reflection acquires a slowness which restrains the natural vivacity of an inventive imagination; this latter, instead of exhausting itself on one subject, delights in an order of ensembles which recalls the manner of the artist rather than that of the logician. The reading of *Emile*, perhaps too a little quiet time in the gardens of Sèvres or Romainville in the company of Rousseau "more passionately fond of nature than any of the persons known to him,"[3] develop in Lamarck a sense of nature. They give fixity to a mind prone to dwell lightly upon things, enable the imagination to gain possession of the outer world and arouse that emotion without which it would have been impossible to discover the fugitive trace of life in monuments of herbals and collections. By degrees, however, this confused emotion acquires an intellectual character. Following the example set by Bernard de Jussieu in the practice of botany, we have the influence of the *Encyclopédie*, the *Histoire Naturelle des Animaux*, the *Traité des Systèmes*. These descriptive studies, free from dogmatism, transmit to Lamarck that living method constituted by the history of positive thought and reveal to him the formal unity of science though not without setting him on his guard against the possible excesses of imagination and the systematic mind. Hence he acquires the sense of legality, he becomes no longer capable of keeping to individuals, of transcending empirical considerations, and giving his ideas a rational organization. The study of plants, insects and worms which constitutes botany,[4] and which he was taught at the Ecole de Médecine[5]

[3] *Système analytique des connaissances positives de l'homme*, 1820.

[4] Condorcet, *Oeuvres*, 1841, t. II, p. 244, "most botanists study insects and worms as well as plants; the insects which, in the number of species, diversity of form and variety of structure should be studied by the same method as plants and like them classified into methodical divisions, have also the closest relations with the vegetables . . . finally, it is in the class of worms that are found those species which mark out, by imperative stages, the transition from one kingdom to the next."

[5] Blainville, *Cuvier et Geoffroy St.-Hilaire*, 1890, p. 15, "In France, botany alone was taught in the medical schools, both in Paris and at Montpellier."

is no longer to him what it was to Rousseau, "a study of sheer curiosity, of no further utility than a thinking sensitive being can obtain from observation of nature and from the wonders of the universe." [6] Connected with the study of minerals and with that of the higher animals, the classification of the vegetables and of the lower animals is no more than one of the preliminary moments which will make possible the constitution of natural history as a science. On the other hand, the determination of the laws which govern bodies organized and unorganized itself presupposes a knowledge of the general properties of bodies. Now, as Lamarck is neither a mathematician nor an experimenter, he abides immutably by the teaching of the Jardin du Roi and regards as ultimate the physical system of Newton and the chemical theory of Stahl. At most he will give himself up to considerations of physico-chemical logic to prove the trustworthiness of the doctrine of the four elements, invalidate the attempts made by experimental chemists who refuse to look upon chemistry as a branch of physics, and uphold the principles of the phlogiston theory against the pneumatists. However it be, from the age of twenty-five onwards and before being a botanist, he is a naturalist and a physicist, and so it is quite natural that, at the age of thirty-two, in his *Recherches sur les Causes des Principaux faits physiques*, he sets forth as the fundamental object of his investigations: "the observation of nature as it is at the present time and the examination of the many and infinitely varied phenomena it offers us in every direction." [7]

But the realization of this logical plan does not appear to be greatly favored by circumstances. While *la Flore Française*, the product of a discussion among students in 1778, affords Lamarck the protection of Buffon and, in the

[6] Rousseau, *Lettres sur la Botanique*, 1805, p. 29.

[7] *Recherches sur les causes des Principaux faits physiques*, 1776, published in 1794, p. 11.

following year, opens for him the doors of the Académie des Sciences, it also dedicates him as the "botanist" in an environment where each jealously keeps to his own specialty. This partly explains what little eagerness was shown by the Académie in appointing reporters to make acquaintance with the *Recherches,* in spite of the presentation of Condorcet. After travelling for two years with the son of Buffon across Europe, where they visited scientists, collections and mines, Lamarck is partially disgraced as the result of a misunderstanding. Forgetfulness in his work as a curator of the King's herbals, family charges and straitened circumstances paralyze his activities. In quest of library work, he undertakes in 1783 the *Dictionnaire de Botanique de l'Encyclopédie Méthodique,* and is compelled to postpone his meditations on physics, his reflections on the winds, the movements of seas and inland waters. He keeps by him, an unpublished work entitled, *Discours sur la théorie de la Terre.*[8] The death of Buffon improves his position but slightly, and, at the age of forty-five, at the time of the revolutionary stirrings which are to culminate, on the tenth of August, 1792, in the proclamation of the sovereignty of the people, he appears to be fit for nothing but the study of the vegetable kingdom.

Though alien to the philosophical movement, Lamarck is a sincere adherent of the Revolution, he burns his geneological tree and becomes a member of the Société de 1789 founded by Condorcet and Siéyès for obtaining a hearing —amid civil factions calculated to rouse terror and reaction—for the voices of "philosophers who have reflected on human nature, thoroughly studied the principles of human societies, and examined what influence the government should exercise over things and men." [9] His adhesion,

[8] *Hydrogéologie,* 1802, p. 115-116.

[9] Léon Cahen, *Condorcet et la Révolution française,* p. 239; on the Société de 1789; cf. ibid., p. 235-248 and Condorcet, *Oeuvres,* to me X, p. 69-76. Cf. *L'avis de Michelet.* Révolution II, p. 301-309.

however, is that of a savant. Lamarck sees the French Republic, aware of the part played by science in social life, propound the problem of national education, remodel the scientific institutions of the Ancien Régime, create new organisms, make of Paris an intellectual center, engage in the diffusion of positive knowledge[10] and propagate a taste for natural science by worshipping Nature and the Supreme Being.[11] The time is past when "the practice of government lagged regretfully behind the progress of opinion and philosophy." And Lamarck comes under the influence of this enthusiasm for science, this feverish desire to do good, this passion for the public weal, which survive the blood-stained aberrations of the Terror until they are stifled by the spirit of speculation and the cynicism of the Directoire. He obtains the impression of a new order of things, a new moral era wherein merit will be recognized, perhaps his own merit realized. With a true sense of his worth and without humility, he offers his services to the new government and shares actively in the transformation of the Jardin du Roi. The disappearance of the *Journal d'Histoire Naturelle,* founded in collaboration with Olivier, Bruguières, Hauy and Pelletier does not discourage him. He submits a project for the founding of the Muséum d'Histoire Naturelle, which is partially realized in the decree of June 10, 1793. In 1794, he is regularly appointed professor of natural history of insects and worms. He publishes and dedicates to the French people his *Recherches sur les Principaix faits Physiques.* In 1795, he offers the Comité d'Instruction Publique to bring out in French a *Système de la Nature,* "setting forth a complete, methodical and precise table of all natural productions hitherto observed." In 1796, he publishes a *Réfutation de la Thé-*

[10] Blainville and Maupied, *Histoire des Sciences de l'organisation* (1845); t. III, p. 21-22, mention during the revolutionary period "the profusion of scientific manuals of every kind circulating among the working classes." Cf. Michelet, III, p. 389.

[11] *Système des animaux sans vertèbres,* 1801, p. x.

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orie Pneumatique and *Mémoires de Physique et d'Histoire Naturelle*.[12] He opens his classes on April 30, 1796. Thus, at the very moment when the *Esquisse d'un Tableau des Progrès de l'Esprit humain*, printed by the Convention, reminds Lamarck that the study of the surface of the globe, meteorology, the study of minerals, vegetables and animals constitute parts of a single science, events have at last enabled the botanist to be at the same time a naturalist and a physicist.

All the same, it would be somewhat inexact to attribute undue importance to the events which seem first to delay and then to hasten the work of Lamarck. The study of insects and worms is the natural complement of the study of plants; the clear vision of the end pursued enables the meditations of the physicist to combine with the observations of the botanist and the discoveries of the naturalist in such fashion as to ensure the inner coherence of a system of ideas that is not subject to fluctuations and regressions. Indeed the different moments of investigation afford a logical continuity which it is important to restore. Lamarck, whose task it is to classify collections and herbals, applies his philosophical conceptions to the work. In the history of botany he discerns an effort to shake itself free, alike from the empiricism of Tournefort and from the dogmatism of Linnaeus. Botany is more than a mere science of words; still it could not be reduced to the establishing of genera. For the idea of species which permits of the grouping under a single type of a mass of living beings presenting almost identical characteristics is devoid of all metaphysical meaning and has no importance except as regards method. The reason why Lamarck uses the

[12] In the bibliography which Revault d'Allonnes offers of Lamarck's works, he mentions *deux Mémoires présentant les bases d'une nouvelle théorie physique et chimique* which appeared in 1797 and are mentioned neither by Packard nor by Landrieu. Now, with almost the same title and a different pagination, the text of these memoirs is identical with the text of the *Mémoires de physique et d'Histoire naturelle*.

scepticism of Buffon, Condillac and Rousseau with respect to genera and nomenclature "which is nothing more than herbalist's knowledge" [13] is that he may the better ensure the physical character of his investigations and recognize with Bernard de Jussieu that the only important thing is the establishing of laws. His originality, however, consists in referring back a portion of the claims of Bernard de Jussieu. He becomes aware that the state of knowledge permits neither of a sufficiently thorough investigation into the way in which plants develop, grow and reproduce themselves, nor of a determination of "the laws which nature has followed in their formation." He purposes, after consideration of the vegetable structure or the organization of plants, to set up only a natural order the aim of which will be to "link together all our ideas, to enable us to apprehend all the common points by which beings are connected, to offer no object to our glance without at the same time seeing all that exists both beyond and on this side of it, and so exercising ourselves in those broad views that traverse the entire sphere of a subject and constitute, so to speak, the intuition of the man of genius." [14] The consideration of living beings in the mass, the determination of the relations that unite the nearest and the most distant living beings permit true deductions to be made. However slight attention is given "to the necessity of presenting at both ends of the order that is set up, extremes with reference to difference of organization or to diversity in the number and value of the organs of the beings that are to be employed," [15] beings arrange themselves in different degrees of organization. Thus Lamarck obtains for the vegetable kingdom—and, by analogy for the animal king-

[13] Cf. Buffon, *Histoire Naturelle* (1748), t. I. Condillac, *Traité des Sensations* (Ed. 1822), p. 287 note. Rousseau, *Fragments pour un Dictionnaire des termes d'usage en botanique et Lettres sur la Botanique* (Ed. 1805).

[14] *Flore Française* (1778) 3rd edition, 1805, p. 44. Cf. *Ibid.*, 4th part, Art. 11.

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dom[16]—a reversible logical series which offers indifferently an order of gradation or an order of degradation according as we start from the one or the other extreme. The ignorance in which he still remains of the nature of life compels him to keep to the descriptive knowledge of organization.

When, however, these functions compel Lamarck to undertake the classification of insects and worms, the discovery of the true nature of the zoophytes by Peysonnel reveals that there is no insensible transition between the vegetable and the animal kingdoms; the partial groupings dimly outlined by the entomologist Olivier, the conchologist Bruguières and Lamarck himself[17] have progressively disentangled from Botany the study of insects, worms, testacea, lithophytes and zoophytes; the work of Cuvier have recently attracted the attention of zoologists to the animal organization; those of Vicq d'Azyr which develop the study of the relations able to throw light on the general organization of beings and offer a table of the animals "in the order of their anatomical composition," make possible a comparison between the lower and the higher animals. Lamarck has but to become aware of this to see that "knowledge of the organization of vegetables is far more advanced than that which we have regarding animal organization." [18] There then takes place a conversion of the attention, bringing with it the consideration of fresh relations and making possible a methodical distribution of the invertebrate animals whose contribution of new facts

[16] and 16 *Mémoire sur les classes les plus convenables à introduire parmi les végétaux*, etc. Mémoires de l'Académie des Sciences, 1785, p. 441.

[17] On two occasions, in an address to the *Comité d'Instruction Publique* and in the *Système des animaux sans vertèbres*, p. VII, Lamarck states that he possesses "a numerous collection of testacea, almost the only one in France whose objects are determined and designated after the methods of modern naturalists and "which he formed himself" during nearly thirty years' research work. Too great insistence cannot be placed on the importance of these texts which prove in what divers fields of knowledge Lamarck adventured.

[18] *Discours d'ouverture du cours des animaux sans vertèbres*, May, 1806 (Rééd. Giard. *Bulletin scientifique France et Belgique*, t. XL, 1906), p. 555.

will frequently make possible alterations necessary[19] without striking at the principle of natural order which enables one to compare the newly discovered beings with the other beings of the series and speedily to determine their place. But Lamarck is not content with arranging ever more numerous collections. Critical reflection on certain strange facts of organization offered by the less perfect animals throws a fresh light on so-called insoluble questions of origin. The natural generation of amorphous polypi which "nature forms and destroys with like facility, whether there takes place the combination or the mutation of a certain number of circumstances," without the aid of sexual fecundation, makes conceivable the existence of living beings that had hitherto eluded physical investigation[20] and supplies a sure basis for the induction that accounts for animalization. When it becomes possible to go back to the origin of the world and to introduce the consideration of time into the study of living beings, then the *Discours sur la Terre* and the study of fossils which constitute "extremely previous monuments for the study of the revolutions through which the various parts of the surface of the globe have passed and of the changes which living beings have themselves experienced there," [21] acquire a new meaning. If everything on the earth's surface is subject to slow mutations and insensible changes of situation and form, nature and aspect, and if on the other hand diversity

[19] On the successive modifications introduced into the distribution of invertebrate animals, see *Philosophie Zoologique* (1809), Rééd. de Martins, 1873, t. I., p. 134.

[20] In *Recherches sur les causes des principaux faits physiques*, Lamarck estimated that "what constitutes the essence of the life of an organic being is probably a principle forever inconceivable to man or at least a principle, the knowledge of which seems as though it must elude both his physical investigations and those of the cause of the existence of matter and the general activity prevalent throughout nature" (p. 185; cf. ibid., p. 213-214), and also declared that he did not wish to go back to the beginning of the world (p. ii). It would appear that, far from expressing his vitalistic convictions, as Delbos admits in a brief study on Lamarck (*la Philosophie française*, 1919, p. 221), these texts express scruples regarding method and Lamarck's fixed determination that this investigation shall retain a physical character, even at the cost of certain limitations.

of circumstances brings for each living being a different mode of existence, then insensibly any living being whatsoever should vary in organization and form. As Lamarck makes analysis his own and thinks, with Condillac, that "the combination in which ideas are according to their greatest relationship is that conformable to the very generation of things," the comparison of reflections on animalization, the relations between the living being and the environment, the revolutions of the globe, the facts of mutation and of metamorphosis explain how all the animals may gradually and successively have proceeded from the rough attempts formed by nature. The logical series is no longer reversible. It acquires a meaning, a direction, a gradation in perfection; it marks how transformations of living beings are brought about by the transition from the simple to the complex. For the descriptive knowledge of organization there is substituted a genetic explanation.

When Lamarck is in a position to determine the general laws of the organization of living beings, he no longer regards himself bound by the reservations that had paralyzed Buffon and given his own investigations a character of incompleteness. There is no longer an order of phenomena that eludes physical investigation; in every domain, including that of life, the knowledge of actual causes suffices to account for the formation of the world and its transformations. The close connection between subjects that seemed far removed becomes evident. The general laws of the organization of living beings are connected with the laws that control the movement of fluids and that of bodies. Natural history or the knowledge of the origin of the relations and mode of existence of the natural products with which we are surrounded everywhere then becomes a *Physique terrestre* linked on to the *Physique céleste* and consisting of three essential parts,

[21] *Système des Animaux sans vertèbres. Sur les Fossiles,* p. 406.

"the first (compromising) the theory of the atmosphere, Meteorology; the second, that of the outer crust of the globe, Hydrogeology; and finally the third, that of living bodies, Biology." [22] The System of Nature ceases to be the dream of a metaphysician. It is permissible to the physicist who can explain the formation of the universe and of all the mutations noticed on the surface of the globe to follow out its realization and to find in itself the process of profound comprehension which will restore their unity to human wisdom and to nature simultaneously.

Thus, at the age of fifty-eight, Lamarck, having arrived at the limit of preliminary investigations, undertakes what he looks upon as the work of Science. Assured that he is acting in obedience neither to a hasty generalizing movement nor to a systematic spirit, he allows the process of intelligence to continue within himself and quietly submits to the "force of things." Still, while it is enough for him to revise and complete in *l'Hydrogéneologie* the ideas set forth by Buffon in the Theory of the Earth from 1744 onwards, he must follow indefinitely observations on the atmosphere and the clouds; he must postpone and finally abandon the idea of a Biology and hasten to utilize the material compiled in his *Recherches sur l'organisation des êtres vivants,* in 1802, in the *Philosophie Zoologique* in 1809, in the first volume of *l'Histoire Naturelle des Animaux sans Vertèbres,* in 1815. Torn between his classes, the study of fossil invertebrates in the outskirts of Paris, and work of various kinds, anxious to remain well acquainted with scientific evolution and that his work shall profit by every discovery, compelled to defend himself against the objections of naturalists who have embarked upon a new path, Lamarck cannot complete the fresco whose outlines he has so boldly sketched. The attempt was not simply gigantic and out of all proportion to his

[22] *Hydrogéologie*, pp. 7 and 8. Cf. *Recherches sur l'organisation des corps vivants*, 1802, p. xvii.

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remaining strength; there was also his state of isolation. During the last seventeen years of his life, Lamarck sees disappear the savants of his own generation, the prestige of the Ideologists become reabsorbed in the apathy of the Empire and the French intellect founder in the wars of the Consulate and the Empire. The teaching he gives at the Museum does not flatter "the wild intoxication" of youth, it scarcely does more than retain a few faithful followers. At a time when, according to Blainville, it is easier to create situations than to find and fill them, science becomes a matter of situations, wit replaces learning, collaboration breaks out into mean rivalry; and Lamarck's colleagues can but turn into derision his attempt to set up meteorology as a science or show their indignation when he delivers up Creation itself to the mechanism of the physicists. After the neglect of official science which has been given up to Cuvier, poverty and wretchedness supervene. Then his eyesight fails him.

But even now his intellect remains unimpaired. For, however painful the experience of life may have been to Lamarck, he has found in knowledge the secret of his liberation. With a degree of abnegation scarcely noticed when action is intellectual, he has set his life interest outside of himself, in scientific investigation. He has suffered at the hands of men, but does he know that passions are natural to men, that "goodness, humanity, moderation, even wisdom are to be found only in the man who has greatly suffered? His own task remains unfinished, but does he not know that the work of science does not come to a stop in the same way as the work of art and that it looks out upon the future? Beyond resignation, without emotion or ineffectual harshness, he has found serenity. And at the age of eighty-five, on the point of death, at the very time when the Restoration is effacing the traces of French civilization, he dictates to his daughter the *Système Ana-*

lytique des Connaissances Positives de l'Homme, a philosophical testament which hands down to men of good faith and goodwill, for the times to come and in spite of political fluctuations, the example of a noble life and the secret of our past greatness.

II. The System of Lamarck

Love of truth and love of the common weal give particular importance to the study of nature. But we could not follow its progress and determine its laws without previously considering the condition of our own nature. It is such that "we know only physical beings and objects relative to these beings. Our thoughts, our reasonings, our principles are but relations or consequences of relations or results of observed laws."[23] We must then abandon what remains outside the world of realities and confine ourselves to the consideration of the physical world, the observation of facts, if we would discover by our investigations a mass of eternal truths susceptible of ensuring that our actions shall conform with the order of things.

If we examine what takes place all around and follow facts attentively, nature appears to us as an ever-acting power which forms, destroys and renews the different bodies all the time; a limited and somewhat blind power devoid of intention, aim or will. "Thus it exists only by the will of a higher and limitless power which, having established it, is really the author of all that results therefrom, of all that exists." Still, though the spectacle of nature warrants an impulse of the heart towards the Supreme Author, it teaches us nothing positive about that supreme power, that will which moves nature and vivifies the universe; it does not enable us to conceive of creation,

[23] *Système analytique*, p. 11.

a mode of action which consists "of making something out of nothing." And only Nature which "does not act except on bodies, with bodies, and through bodies," is an object of human knowledge. Observation of bodies enables us to reduce "the order of ever-active causes and of means which regularize and permit the actions of the causes" to movement "variously distributed among bodies, perpetually maintained or renascent in its source, infinitely varied in its products";[24] it also enables us to determine, by the aid of time and space, the laws that govern all general and particular actions. This is the limit of anything positive we can say of nature. It suffices to prevent us from confusing nature either with the Supreme Being, or with the physical universe, "an inactive and powerless mass of all existing substances and bodies." In the eyes of the physicist, nature is no more than a "mass of non-physical objects," an "order of things," a system of laws. The study of nature is interchangeable with the study of motion.[25]

Hence, the general properties of bodies constituted by the action of nature on matter of which it could neither destroy nor create a single particle, which is immutable and unalterable like itself, but which is finite, extended and passive, become the object of precise determination. But when the naturalist enters upon the study of living beings and thereby restores to natural bodies the peculiar qualities which enable a distinction to be made between organic and inorganic bodies, he cannot find either in the data of physics which studies masses or in those of chemistry which studies the molecular composition of masses, the necessary and adequate element of a positive explanation. Indeed it is impossible to admit, as do certain chemists, that a transi-

[24] *Histoire Naturelle des animaux sans vertèbres,* t. I., 1815, pp. 309-310. Cf. Ibid., 4th part. Cf. *Philosophie Zoologique,* I., 349-351. Cf. *Système Analytique,* 1st part, Ch. 11.

[25] *Système Analytique,* p. 31, "Thus it is an undoubted fact that nowhere in the physical world is there absolute rest, absence of movement, a mass really immutable, unchangeable and whose stability is perfect and limitless instead of being relative as is that of all bodies whatsoever."

tion naturally comes about from the inorganic to the organic by virtue of attraction and of a problematical chemical affinity. Their mistake is in believing that nature and art can produce compound substances. For the spectacle of nature reveals only a "tendency or a sort of perpetual march towards destruction"; crude unelaborated bodies break up; organic decomposition of bodies sets in when life leaves them so that they may undergo successive alterations and transformations. On his side, the chemist can determine the nature of the essential molecules of which compounds are formed only by modifying either the number and various proportions of the principles which compose them or the state of combination of these same principles and the degree of intimacy of their union. The study of combustion, fermentation, and effervescence reveals to him the natural tendency of principles to free themselves from the combinations into which some outside force has compelled them to enter. He himself can only destroy existing combinations. "No one has ever succeeded in combining elements immediately with one another and thus forming a single compound, this is absolutely impossible for man; it is not even possible for Nature regarded simply *per se*, i. e., eliminating the particular causes of the formation of compounds." [26] And so, instead of being authorized to establish continuity between the mineral, vegetable and animal kingdoms, the naturalist is forced to regard as incomparable the groups made up of organic and inorganic bodies, to look upon the inorganic as but the decomposition of the organic and to seek in the organic itself the particular cause of the formation of compounds.[27]

[26] *Mémoires de Physique et d'Histoire Naturelle*, 1797, pp. 239-240.

[27] Here Lamarck expounds the indications given by Buffon in the *Histoire Naturelle*, t. 11, pp. 37 and 39 on the preponderance of the organic and accepts the same theory of mineralization expounded by Dauberton at the Collège de France. In this way he loses the advantage of Hauy's works on crystals. An excellent study by Me. Hélène Metzger, *la Genèse de la Science des Cristaux*, 1918, enables us to follow the evolution of thought regarding minerals in the eighteenth century.

Observation of the beings gifted with life and of the conditions of maintaining life reveals that they alone "have the power, through the functioning of their organs, to form direct combinations, i. e., to unite together free elements and immediately produce compounds,[28] whether like vegetables they have the power of forming primary combinations or like animals the power to overburden with principles combinations already existing." Now "organic function consists essentially in a movement peculiar to beings endowed with life," a movement which "exists without having been communicated by a mass force, since it exists without expanding and becoming proportionately weaker in every part of the mass of the body containing it, and in short (which) is not the effect of an extension between the parts which return to their natural state, like the movement produced by fermentation, i. e., the natural decomposition of bodies." [29] "It operates between the parts or between certain parts of the substance distinctive of these beings" and its effect is the almost incessant assimilation of matter in the substance of the living being which appropriates it to itself.[30] And as, on the other hand, every compound substance tends naturally to destroy itself, the periods of the individual life, growth, maturity, decay and death correspond to the various phases of a struggle between assimilation and destruction. Without even prejudging the origin of life, it is therefore possible to regard life as a phenomenon both physical and organic.

Indeed, to account for this organic movement, different from the physical movement and from the movement of effervescence, Lamarck with Buffon, considers it necessary to recognize, independently of the force of gravity, penetrating and invisible forces that act by a process of

[28] *Mémoires de Physique et d'Histoire Naturelle*, p. 245.

[29] *Recherches sur les causes*, pp. 192 and 192, and *Mémoires*, pp. 245 and 246.

[30] *Recherches sur les causes*, p. 188, and *Mémoires*, p. 248. Cf. Buffon, *Histoire Naturelle*, t. II., pp. 40, 41.

excitation on the interior of bodies. Physical considerations regarding caloric and certain properties of bodies, such as magnetism and electricity, practically confirm Buffon's reasonings and enable us to conceive of the existence of subtle fluids different from containable fluids like atmospheric air, gas and water, which do not come under the senses, and have a particular mode of action. Among the general means of nature, then, we can place, along with universal attraction, the repulsive action of fluids in a state of expansion, such as we see to be the case when the action of light expands the fire fixed in bodies and transforms it into caloric fire which returns to the ethereal state, as Lamarck often noted when dealing with combustion and the theory of the pneumatists.[31] And, as the organized body is to the physicist only a mass of solids and fluids, it becomes possible to account for the organic by combining the action of the general means of nature with the action of particular means which may have been determined by investigations on animal economy, particularly the movement of the fluids of organized bodies revealed by Harvey's important discovery. Hence, life is an "order of things." "Considered in every body that possesses it, life results solely from the relations that exist between the three following objects: the containing parts and an appropriate state of this body, the contained fluids which are moving in it, and the exciting cause of the movements and changes operating therein.[32]

The data of the naturalist vivify this scheme of the physicist and the considerations on the natural generation of polypi along with the study and classification of tissues recently undertaken by Richet, enables us to go beyond the course of an individual existence, to embrace life in the

[31] *Philosophie Zoologique*, t. II., p. 217. Cf. t. I., pp. 359-361 and t. II., p. 80, pp. 215-227. Cf. Buffon, *Histoire Naturelle*, t. II., p. 45 and pp. 50-53, pp. 60-62; *Histoire Naturelle des Animaux sans vertèbres*, pp. 169-172.

[32] *Philosophie Zoologique*, t. I., p. 388.

whole of living beings, to trace it backwards and conceive how the first living beings were able to exist. The natural generation of polypi can only be understood by analogy with generation by sexual fecundation; and, as in the latter case, the development of the living being is due to the action of a subtle vapor of the fecundating matter, *aura vitalis,* upon the embryo, "we are led to believe that, for the simplest living beings, heat which is the mother of generation and as it were the soul of living beings brings about concurrently with moisture—which is necessary to bring about any development—that disposition and that state of the parts which create life whether vegetable or animal, in the small masses of agglomerated gelatinous molecules which nature forms so easily in favorable circumstances." [33] Now, as it is the characteristic of vital movements that they are formed and kept alive by excitation, an induction enables their origin and maintenance to be attributed to the action of subtle and invisible fluids such as the caloric, electrical and magnetic fluid with which every part of the globe is abundantly supplied. For life to appear, it is enough that nature should directly transform small masses of gelatinous matter into cellular tissue "the general matrix of all organization," should fill them with containable fluids and bring them into contact with the subtle exciting fluids which come from the environment. And as these fluids are expansive and tend to disunite the parts they penetrate," we conceive most clearly that these invisible penetrating fluids continually accumulate and work in each organized body, and lastly, by successively escaping after being kept there for a longer or a shorter period of time, excite movement and life therein.[34]

[33] *Système des animaux sans vertèbres,* 1801, pp. 391-392. Cf. *Discours,* May, 1806. Op. cit., p. 559, and *Histoire Naturelle des animaux sans vertèbres,* pp. 174-180. Cf. *Philosophie Zoologique,* t. II., 2nd part.

[34] *Philosophie Zoologique,* t. II., p. 15. A single point remains obscure to Lamarck, through lack of practice in physiology, *the state of the parts.* "That state of the parts which makes possible in a body the execution of vital movements is so little determinable that man could not succeed in imitating it." *Histoire naturelle des animaux sans vertèbres,* p. 65.

Thus, far from it being necessary, with Stahl or Bichet, to regard the force that excites vital movements as a metaphysical principle inherent in the living being, opposed to physical forces, "it exists in all the environments of bodies, it there varies in intensity . . . is by no means dependent on the bodies it vivifies, precedes their existence and subsists after their destruction, excites in them the movements of life so long as the state of the parts allows," and adorns the study of physics. And so the problem of life is solved.

We need now only add a few considerations relative to the movement of fluids in the organism, to the effects of the exercise of life, to the action of circumstances on the organization and the form of animals in order to account for the increasing composition of the organism revealed by the methodical distribution of animals and to determine the mass of inner and outer conditions that call forth development and organic change. If we reflect on the power of the movement of fluids in the extremely supple parts that contain them, we become convinced that "in proportion as the fluids of organized bodies receive acceleration in their movement, these fluids modify the cellular tissue in which they move, open up passages therein, form divers channels, and finally create the different organs according to the state in which they find themselves organized." [35] But the very exercise of life strengthens the influence of the movement of the fluids, it progressively extends and develops the organization, multiplies its functions and reduces to particular functions, in certain parts of the body, functions originally general and common to all parts of the body. Thus organic development is explained.

It thus appears that the nature and form of the parts of an animal's body are subordinate to its functions; light

[35] *Philosophie Zoologique*, t. I., p. 5. Cf. *Recherches sur l'organisation* (Reid, Giard), pp. 508, 509; *Philosophie Zoologique*, I., 404, 405; *Discours XI*, p. 526.

is thrown on the formation of function when we take account of the facts of mutations, when we study fossils and hydrogeology. Whole masses of facts testify to the effective dependence on outer environment in which the living being finds itself, proving that in the midst of perpetual mutations, any change of environment carries with it an imperceptible variation of the living being. Then a new action is added on to the characteristic action of organic movement and tends to destroy its regularity: that of the outer environment. Changes in circumstances cause the appearance of new needs; new functions that have become necessary cause the creation of new organs.[36] And all that then remains is to explain how the organic change can be maintained in the individual and in the species. The effects of the exercise of life "long ago apprehended by observers attentive to the phenomena of organization" enable us to understand how the newly constituted organ is retained in the individual if the need that caused its appearance continues ever so little to make itself felt. "Efforts in any direction, long continued or habitually exercised by certain parts of a living body for satisfying needs exacted by nature or circumstances, extend these parts and cause them to acquire dimensions and forms they would never have had if these efforts had not become habitual actions in the animals that have practiced them.[37] Hence is deduced the principle: "the frequent use of an organ strengthens it" [38] and its corollory "the constant failure to use an organ diminishes its faculties, impoverishes it and causes it to disappear." [39] Lastly, it is proved that "each change acquired in the organ by a habit of employment sufficient to bring it about, is subsequently retained by generation,

[38] *Recherches sur l'organisation*, pp. 512-514. Cf. *Discours an XI.*, p. 526. *Philosophie Zoologique*, t. I., pp. 247-263; *Histoire naturelle des animaux sans vertèbres*, pp. 189-199.

[39] *Ibid.*, p. 511. Cf. *Discours*, 1808, p. 571; *Philosophie Zoologique*, t. I., pp. 240-247.

[36] *Discours an VIII.*, p. 465. Cf. *Recherches sur l'organisation*, p. 510.

[37] *Recherches sur l'organisation*, p. 514; *Discours an XI*, p. 527.

if it is common to the individuals which, in fecundation, meet together for the reproduction of their species." [40]

Determination of the conditions essential to life in the simplest organizations and determination of the laws which govern the increasing composition of animal organization: movement of fluids, heredity of acquired characteristics, destruction of organ through lack of use but especially the creation of organ through use, enable us to restore the process of nature however little the consideration of time be introduced. Here it is important not to forget that "nature does not calculate its operations on the brevity of our ephemeral existence." To conceive of time, we should not trust to the feeling of duration it is given us to experience any more than to the history of human societies, but rather to the reflections suggested by consideration of the layers which compose the outer crust of the globe and the continual displacement of the ocean basin. They testify to the prodigious antiquity of the earth which is generally supposed to date back six thousand years, though it is "beyond human power to reckon this in any way." [41] With time at its disposal, nature has only to bring about sudden revolutions and catastrophies, and to advance by slow mutations. From a concourse of laws, from considerable periods of time and various combining circumstances, all bodies have successively and progressively been formed, beginning with the vegetable and animal elementary forms which produce and regenerate themselves with amazing fecundity.[42] The conservation of races, however, and that of the progress acquired in perfecting the organization of the general order, would be compromised by the multiplicity of individuals "had not nature taken precautions to restrict this multiplication within limits it

[40] *Ibid.*, p. 515. Cf. Condorcet, *Oeuvres*, VI. *Fragments sur l'Atlantide*, pp. 628, 629.

[41] *Hydrogéologie*, pp. 88, 89.

[42] On the independence of vegetables and animals from the beginning, see *Histoire Naturelle des animaux sans vertèbres*, pp. 82-84.

can never transcend. Animals eat one another, except those that live only on vegetables, but the latter are exposed to being devoured by the carnivora. It is a matter of common knowledge that the strongest and the best equipped eat the feeblest, and that the larger species devour the smaller." Hence, "all that appears disorder and anomaly is ever falling back into the general order and even concurring therein.[43]

The man who pictures to himself the march of nature becomes "more reserved in his decisions regarding the stability which he attributes in nature to the state of things he observes." He is in disagreement with the masses, with Linnaeus, and most of the naturalists who from the time of the Empire agree with Cuvier as to the idea it is advisable to form regarding species. To admit that "species are immutable and have been specially created by the Supreme Author of all that exists," [44] is to mistake our own work for that of nature, when it is not yielding too readily to moral or religious preoccupations. Organic development and change show that what is called species has been imperceptibly and successively formed, "has but a relative constancy in its state and cannot be as ancient as natura." [45] It is the needs of classification and nomenclature that have led naturalists to retain exclusively the resemblances presented by a certain number of individuals in the organization and ensemble of their parts, to eliminate their mode of formation and look upon them as members of species which have been kept invariable by reproduction. Still, whatever advantage they may have obtained from this artifice to establish an order between

[43] *Philosophie Zoologique*, t. I., pp. 111, 112. Consideration of the multiplicity of animals on the surface of the globe enables us to include in a system of causes a secondary factor of change which is indebted to the lack of general views and to the exclusive consideration of the problem of heredity detached from the problem of life for the preponderating importance attached to it by Darwin in his *Origin of Species*.

[44] *Discours an XI*, p. 538.

[45] Cf. *Discours an XI*, p. 533.

living beings, this order gradually reveals its inadequacy." The more we gather the productions of nature, the more our collections increase, the more we see all the voids fill up and our lines of separation disappear. We find ourselves reduced to an arbitrary determination which at one time inclines us to apprehend the slightest differences of varieties to form thereby the character of what we call species and at another make us regard as a variety of such species individuals somewhat different which others look upon as constituting a particular species." [46] Consideration of the march of nature keeps the notion of species aloof from all metaphysical signification; a thorough examination of the march of nature emphasizes the precarious character of the methodological notion of species. Both authorize the substitution of a natural order for the artificial order to which we have hitherto been confined.

If we examine the organization of the different known animals, we note different systems of organization which seem isolated and susceptible of being circumscribed by limits and which also constitute masses.[47] Consideration of masses substituted for that of indiviuals and species enables us to distribute beings methodically, according to the degree of complication of the different systems, into a single general series which offers delicate gradations. "Nature having aimed at succeeding in a plan of organization which would permit of the greatest perfectioning (of vertebrate animals), a plan very different from those it has probably been forced to create in order to succeed, we feel that, among the many animals, we ought to find not a single progressively perfected system of organization but various quite distinct systems, each of them having had to result from the point at which each organ of prime

[46] Cf. *Discours an XI*, p. 533.

[47] *Recherches sur l'organisation*, p. 505, the masses, "i. e., the principal systems of organization recognized, which give rise to the classes and to the great families that have been observed." Cf. *Discours an VIII*, p. 467.

importance began to exist." [48] And so the successive appearance of digestion, generation, respiration, circulation, the nervous and muscular systems, the development and increasing complexity of the organs and systems of organs which ensure these functions, the successive modifications that have come about in the general arrangement of the parts, enable us to set up six successive orders: infusoria and polypi; radiata and worms; insects and arachnida; crustacea and annelida; cirripedia and molluscs; fishes and reptiles; birds and mammalia. The hiatuses presented by this natural order should be set down to the fact that we do not know all existing animals nor species that may have been lost. Besides, recent discoveries permit us to conceive of the existence of intermediary beings between worms and insects, molluscs and fishes, birds and mammalia,[49] and the transition remains a plausible one from the non-animalized "monad," a transparent gelatinous corpuscle to bimana and human beings. For, if man were distinguished from the other animals only by his organization, it would be easy to show the transition from the quadrimana to the bimana by changes in actions, upright posture, mastication, and the appearance of a more perfected race which would have taken possession of the surface of the globe, hunted the other animals, and arrested the progress in the perfectioning of their faculties, whereas itself "will have successively created fresh needs which will have stirred up its activity and gradually perfected its means and its faculties." Finally we imagine that this pre-eminent race, having attained to absolute supremacy, may have succeeded in

[48] *Philosophie Zoologique*, t. I., p. 171. The terms used by Lamarck cannot be taken in a finalistic acceptation, for he specifies that harmony is at the end, not at the beginning, and gives to the term perfection a meaning similar to the one it has in the *Ethics*: "Who does not know that in the organization in which it finds itself, every living body whatsoever is a really perfect being, i. e., one that lacks nothing necessary." *Histoire naturelle des animaux sans vertèbres*, pp. 138, 139, note.

[49] *Philosophie Zoologique*, t. I., pp. 154, 155; *Histoire naturelle des animaux sans vertèbres*, pp. 146-150.

setting up a considerable difference between itself and the other races. The need of communicating with ones fellow-beings, the acquisition of signs, of articulate sounds, of the power of speech, distinguish it from the rest. Nevertheless, the orang of Angola and the orang-outang, which, as regards organization, are far inferior to man in bodily powers and intellect, and are incapable of continual upright posture, might be regarded as the mammalia which approach nearest to the human being.[50]

Thus we find that the problem of organization is solved, in a way more complete than Buffon would have dared to hope.

* * *

The system would doubtless have closed in this way, had not a thorough investigation into the principal law of organization led Lamarck to envisage the difficulties inherent in the cause that excites to action, and to note the inadequacy of contemporary psychology which simply determines the action of organization on the character, the inclinations and ideas, without troubling about the repercussion of our actions and habits on organization. To remedy this, he finds himself led to resume the study of faculties in such manner that finally the naturalist and the moralist are one.

The mechanism of the action of circumstances on the living being, a condition of organic change, has been presented rapidly and schematically; and the lack of physiological knowledge has not permitted of a precise statement of the way in which need acts on the organism. Now, consideration of natural order and of the methodical distribution of living beings restores their complexity to the conditions of change, their particular interplay to the elements by whose means circumstances act on the organism. It

[50] *Philosophie Zoologique*, p. 338. We have followed Lamarck's exposition almost word for word.

reveals that, starting with a certain degree of complication, nature has had to transfer to the interior of living beings—and then place at their disposal—the power that stirs up vital movements and actions. This interiorization which constitutes sensibility or *interior feeling* coincides with the appearance of a system of special organs related to certain fluids in motion: the nervous system and the nervous fluid. Now, the nerves and the *medulla oblongata* appearing in insects and in the arachnida, there is no occasion to admit with Condillac, Cabanis and Destutt de Tracy that to live and to feel is all one, and that feeling is a fact common to all animals. They have maintained this theory, acquired from physiologists like Le Gallois and Richerand, only through neglecting any consideration of organization and the final studies of Haller which set up a distinction between *sensibility* and *irritability*. Indeed, the lower animals, infusoria, polypi, radiata and worms merely react mechanically to excitation from without because "the chemical composition of the parts is such that it continually makes them, so long as they are living, contract upon themselves, on provocation from any irritating cause." [51] But on the other hand, as is shown by the investigations of Gall and Spurzheim on the nervous system, this latter is so complicated in vertebrates that it presents a new organ consisting of two hemispheres, to which is due the production of intelligent actions. Thus it is "wrong to have mistaken the system of sensations for that which produces acts of understanding and to have supposed that the two kinds of organic phenomena derived therefrom were the result of a single system of organs capable of producing them." [52] Instead of the modes of psychological life originating from sensation at the cost of successive transformations, as stated by Condillac and the Ideologists, movement, sensibility and intelligence appear successively in the

[51] *Histoire naturelle des animaux sans vertèbres*, p. 90.
[52] *Philosophie Zoologique*, t. II, p. 246.

course of organic change and correspond to different stages of organization.

In this way it becomes possible to distinguish animals as apathetic, sensible and intelligent. Apathetic animals move by external excitation and under the action of light. All their supple parts are animated by a state of tension, a particular erethism which makes them capable of reaction, *organism* being condition of irritability. *Irritability,* "that faculty possessed by all the irritable parts of the animal for suddenly producing a local phenomenon of contraction and then of distension of the affected point," [53] is peculiar to the animal organization,[54] requires the aid of no special organ, is met with in all animals, and is retained after death. From the time of the appearance of the *medulla oblongata* and its development, new functions arise. Animals acquire the power of *muscular movement,* then *physical sensibility* (according to which the general effect produced in the whole being by an external cause is related to the very nerve that was its original cause); then the enjoyment of *feeling*. The different organs composing the nervous system indeed communicate together and are susceptible of experiencing a general perturbation which, taken in itself, constitutes interior emotion. It is determined sometimes by a very dull feeling, "the feeling of existence which results from the confused mass of interior sensations that constantly take place during the existence of the animal by means of the continual impressions that the movements of life exercise on its interior and sensitive parts," [55] sometimes by sensations, whether they remain, excite a need, or call forth the exercise of an independent tendency of the will: the need of assuaging hunger, sexual desire, the necessity of avoiding pain, and seeking what

[53] *Philosophie Zoologique,* t. II, p. 248.

[54] On the privation of irritability and of contractility in vegetables, see *l'Histoire Naturelle des animaux sans vertèbres,* p. 89.

[55] *Philosophie Zoologique,* t. II., pp. 256, 257.

is pleasant for the individual. And, as the nervous fluid, invisible and containable, is found at the disposal of emotion, the interior feeling becomes a source of action and sends to the muscles the exciting nervous fluid along a centrifugal path by means of specifically distinct nerves.[56] However little the action is repeated, the subtle fluids make for themselves easier tracks and the being contracts habitual actions. A leaning towards the same actions causes particular inclinations which become instincts. It is possible to determine the origin of instinct in animals wthout having recourse to metaphysics or experiencing the embarrassment of the psychologist. The instinct of animals, complex actions and the industry shown by certain of them are but "leanings which incite, which sensations call forth by giving birth to needs and which cause means to be adjusted and actions done without the participation of any thought, any act of will whatsoever." And so interior feeling brings about action on the part of insects, arachnida, crustacea, annelida and cirripedia, as well as on the part of vertebrate animals.[57]

From the time of the appearance of the two hemispheres, "a passive organ that retains the impressions it receives," still very imperfect in fishes and reptiles, filling the cranial cavity in birds and mammalia and simply giving the nervous fluid the means of carrying out various phenomena, intelligence comes into being. With the aid of attention "an effort of interior feeling in an individual when moved by need or by an interest of any kind, generally a moral one," [58] and without it being necessary to regard the signs, promoted by Condillac to the rank of immediate causes, as anything more than means, simple and complex ideas are

[56] *Histoire Naturelle des animaux sans vertèbres,* p. 228.

[57] *Philosophie Zoologique,* t. II., 3rd part; *Histoire Naturelle des animaux sans vertèbres,* 4th part; *Système Analytique,* 1st part, Ch. 11, 2d part. Cf. Buffon, *Histoire Naturelle,* t. IV; *Discours sur la nature des animaux.*

[58] Cf. *Histoire Naturelle des animaux sans vertèbres,* p. 236, and *Système analytique,* pp. 257-260.

formed starting with the sensations remarked. From ideas, in their turn, spring all intellectual acts: thought, imagination, memory, judgment. Whatever be their probable mechanism, they all presuppose the functioning of interior feeling, the previous existence of sensations, desires, moral needs, and light may be thrown on them, as Cabanis showed, by the consideration of dreams, of physiological changes, of pathological states like delirium and madness. As for reason, "it is not a being, but rather a state of the organ of understanding," and is reduced simply to "a degree acquired in upright judgment." But then the vertebrate animals are no longer wholly subject to the stirrings of interior feeling. Intellectual acts and ideas are liable to have a repercussion on action and sensibility. They may decide to act as the result of a judgment, i. e., by exercising the will. On the other hand, the sudden manifestation of ideas and thoughts may arouse moral emotions. Indeed it would appear, for instance, that in a state of melancholy the weakening of the viscera may be a consequence rather than a cause. Thus the vertebrate animals show a complexity underestimated by Ideologists who try to find out how the physical acts on the moral. In order to spring from one common source, the physical and the moral, gradually separated into two quite distinct orders, retain something in common and react upon each other when they appear to be most apart. And so it is advisable to complete the action of the physical on the moral by that of the moral on the physical. From a certain stage in organization onwards, a real intervention comes about, ensuring the mastery of the mind over the sensibility.

Thus do the consideration of organization and the reduction of faculties to purely organic phenomena enable

Lamarck to remain faithful to Buffon and Rousseau[59] by subordinating to the partial point of view of knowledge the more general and comprehensive point of view of action, and completing the parallel set up by them between animal and human life. Indeed, while doing justice to the positive character of their work, Lamarck differs widely from Condillac and the Ideologists.[60] Not having as his secret aim the attempt at an impossible fusion between sensation and ideal, he does not purpose to penetrate the mechanism of psychological life by analyzing ideas and taking, for his starting-point, sensation, the impression received from the outer world and charged with a representative content. Going back beyond consciousness, he regards psychological life, as do Buffon and Rousseau, as based upon *need* "which sets up and directs habits, the source of all actions and faculties, from the simplest up to those that constitute instinct and industry, and finally reasoning." And although the explanation of the interior mechanism borrowed from the movement of fluids retains a conjectural character, unity is none the less realized round organic life, round interior feeling, though without the specificity of movement, of sensibility and of intelligence being overlooked. By following the track of nature, the study of man, wherein organization is at its highest point, is related to the study of the vertebrate and the invertebrate animals, and is indebted to this correspondence for a degree of clarity which neither introspection nor the study of physiological changes are capable of giving it.

[59] Cf. Rousseau, *l'Emile*, and Buffon, *Histoire Naturelle*, t. IV; *Discours sur la nature des animaux*. Hence the study in the *Revue Philosophique* of July, 1878, in which G. Compayré interprets Lamarck's psychology in terms of Spencer's "Principles of Psychology" and of recent works on the nervous system, does not define Lamarck's attitude and omits to determine the association between the different systems of ideas in the eighteenth century.

[60] Condillac indeed holds a position midway between Buffon and Rousseau on the one hand, and the Ideologists on the other. With the former he recognizes that needs determine faculties and are principles of knowledge (*Traité des Sensations*, pp. 261-266, 275). On Cabanis see *Philosophie Zoologique*, t. II, pp. 395, 396.

It is enough that the naturalist, taking man as he appears in a civilized state, restores the ensemble of organic conditions in which he finds himself and the influence exercised upon him by circumstances so that the distinction between mind and heart may be defined and there may become possible an analysis of inclinations and passions, the description of which was left to the moralists. At first, man finds in himself nothing but an inner feeling and general tendencies having their root in the instinct of preservation, the tendency towards a state of well-being, love of one's self, the tendency to dominate and a repulsion against destruction, which tend mechanically to manifest themselves. By degrees, along with his joys, needs and desires which increase and multiply, his relations with other individuals and with society vary and complicate his individual interests. But whereas the intelligence of animals is exercised within circumscribed limits by habits and needs, man acquires ideas and knowledge. After many conflicts, education succeeds in mastering the interior feeling and makes of it a reasonable being through participation in *public reason* "which exists in every country and every region of the globe in proportion to the understanding of the men who live there and for some other influential causes."[61] Thus man becomes not only capable of diversifying and varying his inclinations, but he also becomes, to a certain extent, capable of modifying his nature, of freeing himself from the raging influence of the passions, of coming into harmony with nature and of tending towards that dignity which he alone of living beings is capable of winning. Then only does he attain to true philosophy, if it is true that philosophy is interchangeable with the love of wisdom. Love of truth, moderation, tolerance, severity towards self, resignation, respect for order and religion are the inspiration of each of his acts.[62]

[61] *Philosophie Zoologique*, t. II, pp. 410, 411.
[62] *Histoire Naturelle des animaux sans vertèbres*, 1st part.

But that which is susceptible of improvement is also susceptible of deterioration. Indeed, man brings with him extremely variable organic predispositions whose harmony may be disturbed by external causes. On the other hand, civilization develops inequalities of conditions which of necessity imply inequalities of intellectual development. Illumination and science remain the appanage of a small number of individuals. Human passions persist. For "we find man everywhere as nature made him, governed by the same tendencies, susceptible of the same passions, abusing or oppressing his fellow-beings, and given to self-torture." After all, the state of society is "that state in which, notwithstanding and even by reason of acquired enlightenment, the feeblest in capacity is always the victim or dupe of the more abundantly endowed, a state, in short, which invariably subjects the great masses of the people to the domination of a powerful minority." [63] "This order of things which we see everywhere has its roots in the nature of man, and, in spite of everything, will always be what it is. Man's nature will never be completely effaced, although by the aid of reason it may be somewhat modified." In contradiction to the worldly paradoxes of Helvetius and the generous illusions of Condorcet, the effort of mind does not succeed in shattering the order of the passions and reason has only become disentangled from nature in order to establish its own artfulness and the absolute empire of nature.

III. Lamarck and Modern Thought

It would have been difficult to offer a strictly deductive presentation of this system of ideas envisaged in its main lines and apart from any particular physical, botanical, or

[63] *Système Analytique*, p. 206; cf. pp. 161 and 282.

zoological consideration. Consequently, it is not found in Lamarck who is forced by a constant displacement of attention and the concatenation of his discoveries to be constantly altering the order of his ideas and their mode of presentation. And it seems as though it would have been more interesting to define the direction of the reasonings and principles admitted in the course of his investigations. Like Buffon, Lamarck finds himself at a time when the sciences of life are still in process of construction, when, as Auguste Comte expresses it, "biology was incessantly hanging between metaphysics which tended to hold it back and physics which tended to absorb it, between the spirit of Stahl and that of Boerhaave." [64] In his case, however, the two currents only face each other to limit themselves mutually and even to flow in one direction. Divided between the feeling of life and the consciousness of the legality of nature, Lamarck attempts to reduce life *qua* creation to life *qua* "order of things" depending on a vaster order of things, nature, while affording greater suppleness to the mechanism of Borelli.

Where Lamarck attempts to give a physical explanation of life by determining its conditions of existence, starting from present causes, he relies on inadequately stable scientific data, shows too much confidence in physics and in the power of reasoning alone. The desire to assert the specificity of the organ perverts his appreciation of the works of the school of Rouelle and the discoveries of contemporary chemists. Distrustful of experimentation, he pays no attention to experiments on the decomposition of water and air, on combustion as a phenomenon of oxydation, experiments which enable Fourcroy, in his *Philosophie chimique,* to indicate the respective rôle of chemical agents like hydrogen and azote in the formation of vegetables and animals; these enable Lavoisier and Laplace to account

[64] *Système Analytique,* p. 206; cf. pp. 161 and 282.

for animal heat and compare life to a process of oxydation. He does not perceive that they ruin certain of the physical considerations to which he remains attached: the doctrine of the four elements and the theory of caloric. The general and particular means to which he makes appeal remain conjectural from the standpoint of contemporary science. All the same, it is important to remember that Lamarck, after Buffon, deals as a physicist with forces reputed mysterious and asserts their intelligibility.

Where Lamarck attempts to give a physical explanation of organization, the genius of the naturalist exploits a new career. There is revealed the complexity of facts which restores the interplay of reciprocal actions; the mechanism is relaxed; observations arise in great numbers and become co-ordinate. And Lamarck, in a position to begin not only organic development like Buffon, but also organic change, determines in four laws definitely acquired for science the ensemble of inner and outer conditions that produce development and change. He is fully aware of the importance in the distinction between organ and function introduced through the works of Swammerdam, Leuvenhoeck, Vésale and Boerhaave and sufficiently current in the eighteenth century for it to be found in Diderot, that gifted vulgarizer who welcomes second-hand data with infectious and lyrical enthusiasm. And, if he has not the merit of discovering it, he has at all events that of defining the subordination of organ to function, the subordination of function to environment. But the study of fossils and of the globe's surface (combining geology and paleontology) may unveil the characteristics of the environment, the ignorance, in which one still is, regarding the nature and rôle of the liquids of the organism and of the tissues does not allow of a sufficiently concrete mental picture of the interior environment being formed. To determine the relations of the living being with the exterior environment, Lamarck is

bound to approach the interior environment from the psychological outlook, to utilize the data given us by a close knowledge of our states and movements, and to restore the physiological reality which they express. Thus need and habit come into the explanation, not as psychological factors, as a superficial knowledge of the work lead one to suppose and as has been imagined too frequently,[65] but as elements enabling a profound study to be made of the organic conditions of action.

Led by his naturalistic leanings to consider psychological life without starting exclusively with the consideration of man, considerate of the parallelism between animal and human life, Lamarck restores its complexity to the interior being, and their specific character to mobility, sensibility and intelligence. Although his conception of the nervous system is in certain respects schematical and uncertain, although he does not borrow sufficiently from the studies of Bichaton the autonomy of the great sympathetic as regards the nervous system, Lamarck does not content himself with emphasizing, as do Cabanis, Tracy and Stendhal, the primordial character of emotion, whose organic origin he determines. He also reveals the dominion of mind over sensibility at a certain stage of organization. Thus does he fill up the gap left by the Ideologists, the contemporary French and American schools, William James and Ribot, when they regard the action of the physical upon the moral as the exclusive object of all positive investigation and regard as inconceivable the action of the moral upon the physical.[66] Attention could not be too earnestly directed towards this inversion of the relations between the moral and the physical already indicated in Buffon, and found in Bichat and Comte in the more physiological

[65] Packard has anticipated this confusion into which even Le Dantec fell. Cf. *Op. cit.*, pp. 350-353.

[66] Cf. R. Lenoir, *La Psychologie de Ribot et la Pensée contemporaine*, in *Revue de Métaphysique et de Morale*, Nov.-Dec., 1919, pp. 757-760.

form of an inversion of the relations between organic and animal life,[67] and in Renouvier under the more metaphysical form of a transition from simple spontaneity to free spontaneity through the development of the will.[68] It is of supreme interest; without it, unless one were the dupe of crude simplism or abstract deductions, it would be impossible to account for the formation, the development and the transformation of psychological life.

The originality of Lamarck, however, consists mainly in having extended to the domain of life the principle of transformation resulting from the physical sciences and universally accepted in the eighteenth century, though Buffon, even in 1751, was kept from disclaiming the spirit of this principle.[69] Without ever having given a metaphysical value to the notion of species, and without, as has been believed, by a sudden inversion passing from the idea of immutability to that of mutability,[70] Lamarck knows, as we see from the preliminary discourse of his first work, that everything in nature is incessant activity, creation, destruc-

[67] Comte, *Cours de Philosophie Positive*, 2nd Edition, 1864, t. L, 3, 40th lessin, pp. 206, 207, and 4th lesson, p. 489. "But in man himself, this admirable inversion of the general order of the living world begins to become comprehensible only through a very notable development of intelligence and sensibility which more and more tends artificially to transform the human species into a single individual, immense and eternal, gifted with a constantly progressive action upon external nature. It is entirely from this point of view that we can correctly consider this voluntary and systematic subordination of vegetable life to animal life as the type towards which civilized humanity is incessantly tending, although it may never be fully realized."

[68] Renouvier, *Essais de critique générale*, 2nd Essay; *Traité de psychologie rationnelle* (Rééd., 1912), pp. 204-211; cf. pp. 231, 232.

[69] Buffon's reply to the deputies and the syndic of the Faculty of Theology, 12 March, 1751, *Histoire naturelle*, t. III, p. xiii.

[70] The text of the appendix to the *Recherches sur l'organization*: "I have long thought that there were constant species in nature and that they were made up of individuals which belong to each of them. Now I am convinced that I was mistaken in this respect, and that in nature there are really none but individuals" and the definition given of species in the *Dictionnaire de botanique*, could not be interpreted, as Delbos does in the *Philosophie française*, p. 222, as testimonies of Lamarck's original adhesion to the idea of immutability. These *species* are here used in a strictly *methodological* sense. The texts also indicate that Lamarck in his classifications has accepted as a systematic unity the species of Linnaeus, up to the point at which his observations reveal to him the abstract arbitrary and artificial character of this grouping. His reflections bring him to the very point where his experimental cultures and observations are to bring Jordan.

tion, mutation. But he also knows that the mutations, whatever they are, may be the object of physical investigation and positive knowledge. Imbued, like his contemporaries with the spirit of physics, he does not believe that the concrete reality of time or duration is an essential but irrational element which must disconcert the intelligence and flatter the imagination. As soon as he can substitute consideration of the ensemble of living beings for that of individuals, his observations and discoveries become subject for meditation. Under the guidance of Condillac, he reflects on the origin of and the relationship between his ideas, pictures them in the most natural order, deduces general facts and constant laws. And so, just as Voltaire, Montesquieu, d'Alembert, Rousseau and Condorcet give a genetic explanation of the political and moral transformations that have come upon human societies or of the development of the human mind, Lamarck undertakes to give a genetic explanation of living beings. In order to substitute concrete reality for the scholastic entities maintained by the makers of systems, it had been necessary for Buffon to go back to the individual. In order to constitute the science of this reality, it becomes necessary for Lamarck to transcend the individual, to break away from the event. to discriminate the general from the accidental. Avoiding all confusion between the history of life and the science of life, he in no way aims at describing the effective succession of the transformations that have taken place since life appeared, but only at determining the laws and factors of transformation, logical means that enable us to set up a rational order within a domain wherein nothing yet enables us to have sufficiently definite data on the duration of geological and vital mutations, necessary for setting up a chronological order. In this respect his work possesses little in common with the works of such contemporaries as Maillet, Maupertuis, Diderot, Robinet and Charles Bon-

net who have sometimes been regarded as the precursors of Lamarck. It remains equally alien to the reminiscences of Aristotle and Leibniz and to experiments in vegetable chemistry calculated to bring about the recognition of continuity between the three kingdoms. Far from following a unilateral course, mutations spread out like a fan and follow divergent directions, thus rendering all the more necessary the establishment of an ideal continuity in the masses. The *Philosophie Zoologique* is all one with the *Essai sur les Moeurs,* the *Esprit des Lois,* and the *Esquisse d'un tableau historique des Progrès de l'Esprit humain.* The conception of the world is achieved and completed. Discredit of theological myths may have handed over the world to duration, to the action of natural forces, to the empire of change; duration constitutes no obstacle to the work of science; the action of natural forces, whether celestial or terrestrial, may be reduced to laws; all the transformations observed in the inter-planetary spaces or on the surface of the globe are subject to these laws and presuppose a concourse of circumstances which science successfully determines. Astronomy, the study of the surface of the globe, the study of fossils and living beings, the science of manners and customs, become links in an encyclopaedic chain starting with physics and containing "eternal truths wherein nothing is the product of our imagination." Thanks to the collaboration of minds of every kind, the eighteenth century is able to extend the empire of natural laws over nature, life and society.

And a kind of scientific mysticism, of Pythagoreanism, takes control of the mind which forgets itself in contemplation of the silent interplay of the planets. But where mind is satisfied, feeling becomes uneasy. Each step forward in positive knowledge impoverishes the perturbed vein of scientific deism which fades away after rousing outbursts of collective imagination and stirring up revolutionary

fetes. All the vague tendencies satisfied by Rousseau, Diderot and Senancour find refuge in art. The poetry of life is capable of moving the scientist without his dreaming—as does our present epoch—of comparing his movement with artistic creation. For life has stripped itself of all the appearances woven into it by psychological imagination. Creative power finds itself caught in the meshes of laws; it is a long gloomy story that is unfolded, a blind mechanism that knows no limits, man dependent on nature in his deepest being, bent beneath the yoke of biological fatality, a slave to passion. It is reason that tells us alike of its natural origin and of its divorce from nature. In the work it has just completed there is something hostile to the mind, because, in nature, there is something stronger than reason. Intellectual activity no longer affords that sense of fullness and security towards which all the efforts of man unconsciously tend. The hopes of yesterday, faith in reason and in progress, fade away in an atmosphere of discouragement, resignation and sadness. And the audiences of the Muséum feel uneasy when they listen to Lamarck as, with the harsh serenity which Vigny afterwards adopted, he draws aside the veil of "impassive and ever-acting nature."

And so, when the enfeeblement of a mind enervated by social upheavals of too violent and destructive a character brings about the disappearance of French civilization, the guardian of European thought, feeling despoils science of its radiating influence, its social function, its ethical value. All discipline is abolished, all sense of veracity disappears. As supreme mistress, imagination lives from hand to mouth; attentive alike to the victories of the heart and of the sword, she glorifies events and transforms accidents into epics. No longer confined within the limits of scientific symbolism, the natural forces spread themselves over a world given up to chaos. The religious renaissance of

the Restauration and the German metaphysic introduced by official thinkers unite in substituting for the body of positive and scientific explanations which France, faithful to Hellenic tradition, has been working out for over two centuries, a mass of mythological explanations calculated to satisfy at most a civilization which may have fostered scientists but has never had a sufficiently prolonged and close contact with the spirit of science to discover its ethical value and introduce the love of truth into morals. The philosophy of history takes the place of the science of morals, the philosophy of nature replaces biology. The idea of finality reappears. Consideration of species, genera, individuals is substituted for consideration of laws. The theological dogma of creation is received more faithfully and passively than it was even in the seventeenth century, and the scientists who gathered round Cuvier, obliged to keep back fixity of species and questions dealing with origins and ends, cannot help being opposed to the idea of transformation and using their credit to check the progress of Lamarck's ideas. Cuvier's arguments even get the better of Auguste Comte, for positivism marks both the apogee and the decay of the positive spirit. And, however inclined Blainville, Geoffroy Saint-Hilaire and Auguste Comte may be to pay homage to Lamarck, in one direction they misjudge the concatenation of his ideas, the coherency of his work and the spirit of his philosophy.[71]

Meanwhile, as eclecticism declines in favor and the tyrannical authority of Kant, Hegel and afterwards Spen-

[71] Comte, regarding the classification of the lower animals as the only acquisition that Lamarck made of a lasting nature, criticizes "his naive imagination" in the 42nd lesson of the *Cours de philosophie positive*. The combination of the influence of external circumstances upon the organism and of the tendency to arrest modifications in the race, appears to him no more than "a sort of ingenious hypothesis the radical falsity of which is fully recognized by almost all naturalists" (p. 390). "The general principle of Lamarck's doctrine should thus in all respects be recognized as directly contradictory to the true fundamental reasons of organization and life" (p. 394), and according to "Cuvier's luminous arguments" the species remain fixed. Later on we purpose to examine in greater detail the conception of biology as held by Auguste Comte.

cer, increases along with the development of the indications contained in the Critique of the Judgment, the idea of evolution is gradually substituted for that of creation. Starting with the impression produced on the imagination by the spectacle of life, intellects feel justified, by a simple development of sensibility, in restoring to life and organization the metaphysical acceptation given to them by Stahl, in breaking up all continuity of mind or of fact between the physical sciences and the sciences of life, and in contrasting the organic with the inorganic as spirit with matter. A singular disregard for the history of the sciences enables them, without any notice being taken of the fact, to regard as null and void the discoveries of two centuries, and to make the vital movement conformable to the development of an originating disposition, an expansion. Without regarding the external and the internal environment which Claude Bernard has just set forth as the conditions in which life exists, they renew the attempt of Aristotle and Leibniz to reach the metaphysical principle of evolution which they attribute to a deity who has fallen from eternity, and, like a mere creature, pursues his realization through the process of time. And, as France refuses to recognize itself in the eighteenth century, in spite of Michelet and Taine, there is springing up a new spirit which it is possible to see in Ravaisson, Boutroux, Bergson and even in Cournot and Renouvier;[72] for, though mathematicians and physicists, these great intellects are none the less morally disposed to restrict the signification of science and to regard the study of living beings from the metaphysical point of view. Accordingly this study no longer depends

[72] The works of modern metaphysicians large present a conception of biology that is so unscientific and so alien to contemporary science that they justify every reservation that can be made regarding them. Moreover, Renouvier alone in the *Principes de la Nature* (pp. 152-159), has expounded the work of Lamarck; here we find that his moralism and an unjustified assimilation of the Critique of the Judgment and the *Philosophie Zoologique* (p. 265), assert the confusion between the idea of evolution and the idea of transformation.

on science but on metaphysics, if the individual, duration, quality, contingence and moral freedom are its essential characteristics. Romanticism and symbolism aiding him, the philosopher, in quest of mystic communion, enters upon the poem of life, the romance of evolution.

It may thus be understood to what oblivion Lamarck's work would have been destined, had not French scientific circles, respectful of the history of science and of the concatenation of scientific discoveries, remained faithful to our intellectual traditions. No doubt they had participated in the criticisms addressed to Lamarck by Auguste Comte; they were too eager after experiments and also too prudent to give themselves up to ensemble views of things; they were able to accept from Blainville and afterwards from Charles Robin the idea of a science dealing with the action of environment on the organism, without seeing in this anything more than a special kind of discipline. And Claude Bernard himself scarcely appears to have suspected that the notion of function, as applied by himself in physiology, had constituted the pivot of the thought of Lamarck. All the discussion regarding the Origin of Species, about the year 1870, is needed for scientists who had remained aloof from transformism to become reconciled to the generalizers, to discover the links between the problem of heredity and the influence of environment, and to restore its true meaning[73] to the *Philosophie Zoologique,* which had just been reprinted by Charles Martin in 1873. Not only do they look upon Lamarck as the founder of the science of environments, but they also find, in the direct or indirect action of environment as enunciated and, in a way, codified by Lamarck, a natural cause of variation that has a less

[73] Cf. Andlev, *La Jeunesse de Nietzsche,* 1921, p. 117, with reference to Nietzsche's stay at Bale. The zoologist Rutimeyer of Bern collected innumerable new facts in palaeontology, establishing bold and methodical hypotheses. Quite open-minded and accepting the idea of transformism at that time strongly opposed, he was nevertheless no dupe to exaggeration, and though a late arrival, he was able to recognize Lamarck, who was then forgotten." Cf. Mutimeyer's *Le Neo-Lamarchisme,* pp. 332-345.

accidental and a more general character than the hazards of sexual fecundation invoked by Darwin. Lamarck's ideas are reintroduced into scientific speculation; at first, when combined with the ideas of Darwin, they gradually acquire an independence of their own. Giard is the first to contribute to their propagation by the distinction he makes between the primary and the secondary factors of change. Rabaud shows what a fruitful hypothesis of work they constitute, while Le Dantec, with great critical acumen, restores their concatenation, links the theory of organic development and change on to that of life and emphasizes the physical character of the speculations of Lamarck. Whereas Hyde and Cope, the American scientists, constitute a Neo-Lamarckian school, we in France find that Lamarck's scientific discoveries, however valuable they may be, perhaps retain their importance only from having been studied with scientific criticism and even in the spirit of scientific philosophy.

It remains for freedom of thought—which could not tolerate any divorce between science and philosophical speculation—to deduce from a study of Lamarck the lesson it contains. It may be that we cannot escape the influence of our age and that we unconsciously come under the disturbing action of the ill-defined cross-currents in contemporary anarchy. But when we bring together the conception of the world and of man contained in the philosophy of evolution and that of the world and of man contained in a system of ideas which asserts the universality of change and the possibility of determining the laws of change always and everywhere, that is enough to effect a conversion within ourselves. Such a confrontation argues the recoil of our intellectual traditions, the confusion and decay of thought in France during the nineteenth century. It restores to their former rights two centuries of French thought, juggled away, so to speak, by Victor Cousin, and

supplies the elements of a common standard for appreciating the past century. Less than any other has "the century of history" been able to survive the change which constitutes the common law of nature, of life and of society. To keep knowledge and action aloof from fluctuations, to satisfy the need for security, this century has employed means of fortune suggested by the imagination. It has forgotten that nothing but the moderate and cautious exercise of the intelligence and scientific symbolism are capable of making knowledge continuous and action virile. Hence the uncertainties of biology and the delays in constituting a science of human societies. Yielding to the sense of life, enamoured of qualities, we have thought we could find in romantic Germany, in decadent Greece, in Asia, the secret of the mysteries of Bona Dea. The zeal we employed in passing through the different grades of initiation was a sufficient testimony to the fact that we had, almost all of us, lost the secret of our civilization, of Western civilization. And yet it exists in the philosophy of Descartes, in the *Histoire Naturelle* of Buffon, in the *Essai sur les Moeurs,* the *Esprit des Lois* and the *Philosophie Zoologique.* All these works constitute but one and the same effort to "see things as they are"; they alike presuppose acquaintance with the positive character of knowledge and with the logical character of our explanations, self-control, discipline of our feelings. In themselves, science and action are blended in wisdom, *sapientia humana.*

It is not a matter of indifference that Lamarck, through the tendency of his work and the example of his life, should bring this back to our mind. Eclecticism, academic syncretism, immoderate curiosity regarding foreign thought, retracing, as previous to 1914, the lines of French thought at a time when we had yet done nothing to remedy our ignorance of our own past, might perhaps afford the illusion of intellectual life. Sooner or later the events of

world-wide importance which have occupied our attention ever since 1914 would reveal the futility of making the attempt, and would announce to the mind its own decay and the death of whatsoever participates neither in the actions nor in the life of the nations. We must make our choice between a shadowy unreal thought, one without either life or soul, and French humanism.

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GEORGE SANTAYANA: A PHILOSOPHY OF PIETY

APART from the proverbial difficulty in treating a contemporary, Santayana presents some difficulties all his own. If Kant's or Hegel's method of presentation is barbarous, then Santayana's is too civilized. It is anything but incisive and leaves many things for the reader's imagination to supply. One of the most striking traits of his method is to omit as many of the supporting arguments as a thinker and philosopher decently may. Also, whenever the spirit moves him, which is quite often, he has recourse to elaborate poetical figures the logical intent of which it is not exactly very easy to grasp. What is true of the parts of Santayana's work is also true of the whole; the general philosophic sphere that he deals with is not presented as a coherent well-integrated unit. There is a certain detachment, a certain loose-jointedness about it all. Santayana carefully chisels the stones and pillars of his structure but he lets the vital cement run a little thin. How one shall present his philosophy is thus a good deal a matter of personal preference. The presentation of his thought is almost pliable enough to yield to any method of approach.

As is well known, Santayana's chief work is entitled the *Life of Reason.* This phrase has a two-fold implication which the title page does not explicitly convey. It may mean, in the first place, the life of reason as the history of reason, its career in time and place, i. e., as the sub-title

phrases it, it may mean the history of "the phases of human progress." In the second place, the phrase may mean, the life of reason as the reasonable life, or the life of wisdom. At first glance these two meanings seem quite distinct and unrelated, but at second glance, or at length, at a reading of the work, they are seen to be quite closely connected, indeed, in a sense essentially the same. The reasonable life is seen to be a life that exemplifies or is in accordance with principles that have marked the history of the development of the life of reason. And as we choose we can consider the one or the other as of primary importance in Santayana's philosophy. In this paper primary importance is given to Santayana's conception of the reasonable life, and the life of reason is here considered as material to support his case. To consider the main theme to be the reasonable life is at least not wholly false, and the many advantages in understanding gained by this method of approach more than compensate for the possible unintentional distortion of the philosophy itself.

There are several reasons why Santayana should especially take upon himself the task of defining and explaining the reasonable intellectual and moral life. Undoubtedly one reason is that moral philosophy, as he tells us, is his chosen subject. But this alone could hardly constitute the necessary reason. It is rather the fact Santayana found the philosophic atmosphere, particularly at Harvard, very irritating, and he was convinced, as a result, that very few of those who should know knew what the reasonable life is He was flanked, on the one side, by the Absolute, and on the other by pragmatism. Of the two it was possibly the Absolute he found most disagreeable and he damned and detested it as much as ever did James. But pragmatism fared only a little better at his hands. For all James' human sympathy and keen desire to advance the best interests of mankind, he had, for Santayana, only a very miserable

notion of what man's best interests were. In one sense, at least the *Life of Reason* is most unmistakably a tract for the times.

With this motive in mind, it is not difficult to understand why Santayana should turn to consider the intellectual and moral history of the race. Every system of ultimate values is required, by learned society, to have some basis, or, failing that, at least some justification. What form the justification takes, it does not apparently matter. In the history of theory there have been forms as various as utility and religion, convention and metaphysics. It also does not seem to depend upon your method how valuable your system will be. Bentham's principle of utility, for example, does not yield results any the more valuable, humanly or socially than does Kant's abstract and all too rational metaphysical method, which makes a fundamental point of disregarding human interests and needs entirely. What seems to be true, in the case of ultimate principles, is that they are determined by the temperament and social conditions of the thinker; i. e., that they are essentially irrational in character. The philosopher in this is much like the lawyer. Both write their arguments after they have decided on the case, although to admit this seems, to some, to rob philosophy not only of its validity but also of something which is far more precious to them—its dignity. To combat this dislike for the irrational, or the natural, is part of Santayana's task. The fundamental principle of his philosophy is that everything must be in its origin irrational and that its rationality is the ultimate prize it wins. It is perhaps for this sponsoring of the irrational that Santayana's own philosophy has been termed dogmatic and prejudiced. But we must not forget that a theory which we call prejudiced or biased, when we are less indisposed to it we call a point of view, and when we find it in harmony with our own opinions we call it a flash of insight.

UMI

Santayana could not follow the metaphysical tradition if for no other reason than that, as he tells us, he has no metaphysics. For much the same reason he could not choose religion, even though so recent a thinker as James seemed to consider religion the only possible valid basis for a system of values. If, however, we are enlightened enough, as Santayana certainly is, to consider religion as being basically nothing more than a particular formulation of individual and social experience, religion can serve this eternal purpose no more than can the crude unformulated custom itself. Whoever has read Sumner's *Folkways*, for example, will not have to be persuaded upon this point.

Santayana was guided in the actual choice of his field of illustration by reading Hegel, and even had he not told us so, the undoubted resemblance could not have escaped notice. That he should approach a task so great, with such serene confidence, was due to the fact that he was not interested in doing with history what Hegel or any other would-be-historian did. To trace the intellectual and spiritual history of the race, and adequately, would require a knowledge and understanding of a range of historical information far greater than any individual could master. Also one temperament could hardly play the sounding board to so diversified a variety of attitudes and interests as appear in the different periods of history. But when, instead of attempting an adequate and complete history of the race, you use history as illustrative material of your point of view, as your foil, the task ceases to be formidable. And it is in this fashion that Santayana does utilize his historical material, just as earlier in life he had modestly restricted his choice of illustration to poetry and religion. His attitude, briefly, is more that of a poet than either of a philosopher or historian. He consciously selects what attracts his mind's eye and fits his purpose, and paints his vision as vividly and accurately as he can. Santayana's work is not

one of objective analysis and description but one of sympathetic reproduction and personal evaluation. The *Life of Reason* is a stupendous soliloquy.

II

Professor Dewey, in *The Need for the Recovery of Philosophy,* makes the following remark: "It is a shame to devote the word idealism, with its latent moral, practical connotations, to a doctrine whose tenets are the denial of the existence of a physical world and the psychical character of all objects." All of Santayana's work is well in line with this protest. It is a serious attempt to restore this notion of the ideal which has, as Santayana expresses it, "a true ideality." Throughout his work there is an unwearying insistence upon the humanly relevant character of the ideal. The ideal, for Santayana, has its natural reference as well as source; an ideal that is an ideal of nothing is no ideal at all. The ideal, or "flying essence" as he calls it, is a goal of human effort; a form that is desired and that all nature and experience ought to receive. An ideal must necessarily be a prophetic vision of some state, desirable but not yet existent. Did the ideal exist, "action," says Santayana, "would have lost its function at the same time that thought lost its significance." [1] The ideal is an end toward which we strive and in no sense a force or a state. Ideals, in a word, are our purposes; and to consider our purposes as efficient powers in the world is the first step on the road to neglecting rational labor.[2]

For the complete restoration of the ideal to its pre-metaphysical status it is not sufficient, however, to proclaim the purposive character of the ideal; it is also necessary to show how it arises from a natural source. This Santayana

[1] *Reason in Art,* p. 29. The Life of Reason in the sequel will be referred to as follows: I—Reason in Commonsense; II—Reason in Society; III—Reason in Religion; IV—Reason in Art; V—Reason in Science.

[2] II, 190.

does. In the *Life of Reason,* in five different spheres, he traces the development of the rational out of the irrational, of the ideal out of the natural flux.

The general metaphysical doctrine (which Santayana avers he doesn't possess) underlying his philosophy is developed in the first volume, called *Reason in Commonsense.* Santayana takes over the Heraclitean doctrine of the ceaseless flux that flows relentlessly on, almost in its ancient form. He also adopts the Democritean conception that the universe is a mechanism, i. e., can be explained on mechanical principles. The discovery of these principles is the task both of common sense and the higher common sense called science. Common sense first hews into shape the formless flux introducing into the utter chaos some aspects of cosmic order by the rough and ready concepts which still constitute the chief mental stock-in-trade of that convenient figment—the man-in-the-street. The task of science is to refine, correct and enlarge the primitive concepts of common sense. The most important of these concepts, "the dialectic of the irrational," are things, qualities, time, space and unity. The discovery, if not the actual creation of these quasi-metaphysical elements—a point Santayana is not uniformly clear upon—constitutes the signal achievement of the natural human mind. For the Absolute, Santayana makes no provision at all. He is quite sceptical about its value, because what can accumulate and compound impressions or have a memory and an experience is not an undifferentiated eternal uniformity, but that which is living, changing, plastic. At the very outset of his inquiry Santayana disclaims any dependence upon "the real universal order, nature, the absolute and the gods." [3]

The source of all form, of all mechanism in nature, is the living mind, "an eddy" in the flux whose individuality is momentarily maintained by the course of events and whose

[3] I, 39.

value consists in the interests it embodies. It is around the vital interests of life that the primitive concepts grow primarily for utility and only incidentally for insight. Were it not for sentient beings possessing a brain that registers sensations, the Heraclitean flux would pass by, blind, confused, indistinguishable. It is only because we are centered in our interests having a locus in space and a perspective in time that the flux becomes a universe congruous with our powers and useful to our needs.

The role of consciousness in this enterprise of converting the blind flux into an intelligible universe is not very great. Consciousness, for Santayana, is "an irresponsible, ungoverned, irrevocable dream." [4] It is a register for the body, but it does not act itself. When this irresponsible dream, through happy chance, becomes symbolic of the conditions that bring it into being, it becomes perception which is not its primary phase but its "ulterior practical function." [5] This doctrine is most clearly brought out in Santayana's explanation of how we come to know of the existence of fellow minds. He rejects as fallacious the two theories that have been advanced as explanations—i. e., that we infer fellow minds by analogy and that we are immediately aware of them dramatically; the first theory would require us to be more conscious of the bodily accompaniments of our feelings than we can possibly be, besides requiring us to have all the emotions and as intensely as every one else; the second theory verges on a mystic solipsism that cannot account for the reality of actual society. It is, according to Santayana, neither by analogy nor by dramatic representation, but by chance that the mind becomes conscious of fellow minds. Psychic qualities are, at first, attributed by the mind to all things. This is the heydey of animism and the pathetic fallacy. The pathetic fallacy necessarily often leads to error in a world that is

[4] I, 49.
[5] I, 50.

not wholly sentient. But when emotions and purposes are imputed to objects that happen to be both sentient and human, and are moreover living through the same experience, the pathetic habit of mind, the "irresponsible dream" will "happily grow significant," and true because the same circumstances—a common danger or common delight—will arouse in the participants emotions that are substantially identical.[6] The conditions of true perception and adequate understanding are, in a word, identity of situation and similarity of nature. This doctrine, whether altogether true or not, is at least in harmony with the ancient admonition to put yourself in the other fellow's shoes, or, as it was more genteelly and metaphorically expressed, to love your neighbor. Intelligence is not a force in life, but an achievement, and Santayana points to historic man, if not as a proof, then at least as an illustration of this fact.

It is the animal or human nature then, and not consciousness or intelligence that forms the nucleus about which the blind flux revolves and becomes rational. Animal nature and its interests involve at least a partially fixed purpose, a point of reference, a vantage ground from which to survey the flux. The natural basis of the rational is most clearly shown in the categories that are first developed, viz: the categories of the good and the bad, of the harmful and the pleasant. The dominancy of these categories in early experience is evidence of the pervasiveness and persistence of the pathetic fallacy. This close dependence of what the mind thinks upon what the body feels is true not merely for the instances above but is a general phenomenon. The unification of nature is possible because the mind (i. e., the body) is unified and "belief in indeterminism is a sign of indetermination."

The creation—or discovery—of the rational structure of the universe is by the psychological process of concre-

[6] I, 50.

tion. Qualities for Santayana are concretions in discourse, things, concretions of concretions, or concretions in existence.[7]

In the history of philosophy one of the problems has been to account for and determine the status of qualities. They seem to be adventitious elements in being, appearances that at best betray the reality that is behind—or beneath. And it has always been with a sigh of anxious relief that the philosopher has, until the advent of Berkeley, fallen back upon the so-called primary qualities as the final mainstay of his vanishing world. In Santayana's theory, however, the tables are reversed. The qualities have definite and primary status; it is things that have to go begging for recognition. Many repetitions of sufficiently similar sensations create in the mind the notion of a unitary sensation or image which is the result of the accumulated and compounded impressions. This is a quite Humian explanation, for Hume is never so anxious as to impress his reader that essences or qualities need not exist; the association of ideas and the effect of unity that is produced on the mind when differences gradually appear make us believe in them anyway. Qualities are concretions in discourse, ideal unities in the mind, nominal essences; things are concretions of concretions, the principle of their conjunction in the mind being their contiguity in space and their succession in time.

These secondary constructions are more alien to the mind because the mind is continually dependent upon the external world both for its knowledge of things and the verification of its knowledge. Qualities, on the other hand, transcend time and space, they can be held in the mind and moulded at will, they are eternal; and things, in comparison, are ephemeral particular expressions of them. It is for this reason, Idealism, the idolatry of quality, is so con-

[7] I, 124.

genial to the human will and also why an epistemological heaven—the frailest of them all—is so readily built for the idols—the builders have merely to feel their muscles to prove their strength.

In all this there might seem to be a fundamental contradiction. Santayana holds that it is human nature that lends form and permanence to the flux, but human nature, a part of the flux, is not stable itself. But this is a contradiction more apparent than real, since he does not maintain that human nature gives to the natural flux its definitive form, a form that all human, or better, all rational natures would have to agree in according it; quite the contrary, he maintains that the form given is dependent upon our interests and our needs, which are necessarily peculiar in nature and limited in scope.[8] The significance of our constructions will last as long as our present powers will last, and the constructions will change and evolve, with the change and evolution of human nature. In principle Santayana is here quite in line with those modern biologists who, happening to be also prophets and theologians, warn humanity that if they do not fulfill the expectations of God (who, one cannot help suspecting, is none other than the biological prophet himself in disguise) will set up in our place a more pretentious and presumably more successful experiment.

III

The development of the rational out of the irrational, of the ideal out of the real, or better, out of the flux, is of a somewhat different nature in the volumes succeeding *Reason in Commonsense*. In the latter volume the task is to show how the irrational flux is made (or conceived as being) progressively more rational by human nature,

[8] Cf. *Soliloquies*, etc. *"Skylark"* and *"At Heaven's Gate."*

which is itself fundamentally a part of the flux. The development is principally one of human concepts, originally crude and inadequate, becoming more refined and more adequate. The final achievement of precision is, of course, the task of science and is considered in the volume devoted to it.

The case of the development of reason in society is, in one aspect, entirely different. It is not the increasing rationality of concepts of society that is traced, but the evolution of society itself through successive stages to the ultimately rational form. And what Santayana means by society becoming more rational is quite unmistakably that it is becoming increasingly more adaptable for rational human ends.

That Santayana is concerned in his analysis with the logical and not historical development is quite plain. Otherwise, he would be accused of writing his histories like Hume, with the sources on the table just comfortably out of reach, and of displaying unbelievable naivete, for he makes love the basis of marriage and the family the euthanasia of love. Even sex attraction, powerful and pervasive though it is, is nevertheless too fitful, too unstable a force to be the basis of so persistent and stable an institution. Dialectically, however, there is a certain advantage in, or even necessity for starting with the human pair—a need that was also felt by the eminent dialecticians of the Book of Genesis. There is furthermore an added advantage for Santayana in starting with love, for it, in a way, epitomizes the whole nature of the rational process in society in particular and in the universe in general, the essential nature of which process is, as Santayana puts it, to "turn(ing) the friction of material forces into the light of ideal goods." [9] Grounded as love is in the crude and irrational fact of sexual need, it transmutes its prosaic function into

[9] II, 9.

something ideal. The momentary and oppressive need so characteristic of the vital flux in its blindness and immediacy by undergoing the various disciplines of habit, social restraint, and possibly reflection becomes less oppressive, and immediacy makes way in favor of a more permanent object and a remoter goal. The sexual man is first transformed into the lover, and the object of his desire becomes for him the symbol of the beauty and goodness he aspires to appreciate and know. And when the lover is transformed into the father and head of a household, the final stage and fruition of love has been reached as well as the highest form of social rationality possible in that system. In this spontaneous growth of organization about a few primal and disjunctive needs we see the fundamental principle of life that Santayana wishes to draw attention to manifest itself quite clearly. The reason that appears in the family, the wisdom of harmony of diverse interests it expresses, is not something foreign to it, something superior or divine superimposed upon the crude basis itself. Its reason is a natural outgrowth of the basal phenomenon and is just the sign of the complete and final harmonization of the universe that it constitutes.

When we turn to society as such, the principle of development may indifferently be termed, ideality, rationality, or freedom, if we understand by the last term intellectual and moral as well as physical freedom. From the proverbially blind and hopelessly enslaved and narrow stage of society euphemistically called love, the family with its wider interests and firmer basis arises. The beneficent institution of the family comes (to introduce for a moment a harmless teleology into nature) to save humanity from intellectual and moral strangulation. A divine afflatus may occasionally carry lovers into the realms of ideal goodness and beauty, if not always of truth, but even when love is all on the high key, it is also all on one note. But the

ills we fly to in society or the family (for in the family we have in nucleus, at least, all the possible complexities, restraints and disturbing problems found in the larger group) but the ills we fly to are scarcely any the less destructive to the life of reason. Society, too, binds the individual to material needs and interests and entangles him in all sorts of irrational relations. The only advantage is that the interests and relations are of a wider range; but the bondage to material, irrational necessity is just as strong, the demands upon the individual just as imperious and oppressive, the round of life just as monotonous.

In society, as in the family, we are largely conditioned by accidents of birth, which even in the most favorable of environments determine categorically our obligations and rights. Our national as well as our family heritage is given to us without our consent. As long as we remain within these circles of activity we are in no vital sense free. This does not mean we cannot cultivate rational friendships and ideal loves in natural society, but when we do so, as when we make a friend out of a father, we ipso facto transform natural society into free society, which is the next highest form.

The basis of free society is common ideal interests. The highest form of free society is friendship, its commonest, most ephemeral form the comradeship of good fellows well met. Friendship, of course, more closely approaches ideal relationships, for it is less dependent upon fortuitous circumstances, and looks, moreover, towards a higher goal. We fall in with our comrades, our friends we choose, and the basis of choice is the common vision pursued.

What Santayana has given here as the logical and rational development of society from the natural state to the free is almost identical with the legal development of society Sir Henry Sumner Maine characterized as the change from status to contract. Santayana, however,

escaped Maine's error of considering his analysis to be historically as well as logically true.

It is in the highest form of society, ideal society, that we are entirely freed from the hampering misfortunes of time and place. The symbols of nature, sensation and destiny that are science, art and religion, i. e., truth, beauty and goodness, are our ideal companions. When we dwell with them, we dwell in the realm of essence, of perfection; we live in the mind and are noble beings and true philosophers.

IV

The essential theme that Santayana develops in the first two books is, with respect to the fundamental process noted here, repeated in the remaining volumes in the different contexts. It is not necessary, therefore, to go into any further detailed analysis.

If we turn to the consideration of reason in art, the development may be divided into two stages. There is, first, a logical, though not historical, relation between industrial arts and the fine arts. The industrial arts are logically antecedent or preparatory to the fine arts. They mould into more humanly amenable state what a tender-hearted mother nature would have provided for us. The industrial arts are forced; they arise in response to needs—and the satisfaction of those needs is their end. Fine arts, on the other hand, are free; they are the spontaneous expression of the inner man, the carefree play of fancy. If it is a need for expression that creates the fine arts, it is a need that is the result of fulness and not want, as is the need that occasions the industrial arts. If necessity is the mother of industrial invention, then over-abundance is the condition of artistic production.

The second stage of development is within each form of art separately. The function of the industrial arts is to

supply man's needs. In the measure that they become more productive, supplying his needs more adequately and efficiently, and the less irksome, draining less of his strength and depriving him of less of his freedom, the greater is their rationality. And the fine arts, the more they express the full intent of spirit, fixing in most appropriate form the ideal the soul envisages, and the less they entangle the soul in the meshes of its expression, making the soul's products either trivial or perverse, the more are the fine arts an instance of rationality.

In this respect, the development of science is the same as that of art. The task of art is to embody in suitable and adequate forms the soul's aspirations, its visions of beauty; it is a task of moulding inexpressive matter into expressive form. The task of science is, in a way, just the reverse; it is a task of moulding the soul's symbols, expressions and forms of thought to fit the matter outside which science seeks to understand. Obviously the limitations of science are due to limitations of the powers of man; whereas the limitations of art are primarily due to the limitations of the material that art has to deal with.

The most rational science is dialectic, the science that concerns itself with essence; the most irrational is history, for history is a subject matter too complex and inaccessible to human observation and experiment. In between range those subjects that lend themselves increasingly more freely to mathematical treatment—which is the purest form of the study of essence. The term science has been used mainly as a description of the method and objective, and has not been restricted, as it perhaps should be, to the result. So any attempt that lays claim to accuracy (as far as that is possible with the subject) and presents a program that it hopes to carry through is admitted into the exclusive set. As a result, Santayana says of science, what might be perhaps more properly said of scientific men, that

"it is willing to reason in any terms and to study any subject matter; where it cannot see necessity it will notice law; where laws cannot be stated it will describe habits; where habits fail, it will classify types; and where types even are indiscernible it will not despise statistics." [10]

It still remains to consider religion—and we may do so very briefly. At first the content of religious rite and dogma is the crude, unchastened emotions. Fear and need and their breed of primitive and irrational passions are the first emotions to find consecration in the gods. In time, however, human nature acquires some refinement. The vulgar emotions and barbaric customs are transformed, in part at least, and supplant the original content of religion. The evolution or development of religion is thus a phase of the evolution of man's emotional nature. The gods, instead of being representative of natural processes and symbolic of natural needs, become representative of the gentler human characteristics and symbolic of human ideals. The sign of the gods' increasing rationality and human importance is their increasing ideal anthropomorphism.

Parallel to this development of the content of religion, there is a development in the attitude of the individual towards it. The two, of course, are closely knit, and only for purposes of exposition is it legitimate to separate them. This change consists in the individual becoming independent of religion in becoming emancipated from its early domineering rule. The final stage is reached when religion is no longer regarded as honest revelation, and is considered in the light of its poetical and general human emotional value. The literal value of religion must first be forgotten before its true value can be fully appreciated. And its true value consists in another world it provides for men to live in; in the meaning it gives to life by broaden-

[10] V, 98.

ing the mental horizon, by mapping out the individual's cosmic bearings; in the insight it gives into the worth of life and the nature of human destiny.

V

It was suggested at the outset that Santayana's doctrine is fundamentally a doctrine of ultimate values, and that the nature of his work consists in amassing supporting material in the form of corroborative illustration. It was not intended that this suggestion be taken in too literal a sense, but be taken as a method of approach, a possible interpretation that is at least partially justified by the facts.

Anyone who has read Santayana will have noticed the recurrence of certain attitudes, certain moods, certain rather unreasoned likes and dislikes. This comes out most clearly, perhaps, when Santayana is discussing other philosophers. Such discussion is never of the nature of criticism, as it pretends to be, but is invariably of the nature of invidious comparison, a phenomenon which is not at all economic, Mr. Veblen notwithstanding. Those philosophies or points of view he expressly dislikes, Santayana, to a neutral reader, seems to attack too acrimoniously, too insistently, for a detached and intellectual philosopher. Such are, for example, his attacks on Protestantism, romanticism and transcendentalism. It is probably for such reasons many think Santayana in his writings dogmatic, superior and, of course, unconvincing.

The explanation of these traits in Santayana and of the essence of his philosophical position, it is here suggested, is to be found in his fundamental emotional nature or temperament, namely in his piety. The essence of piety is that we appreciate and revere the sources of our being, and that we enter into the tradition of which we are a part, that we live in the light of ancestral ideals. Piety, when

transformed into a metaphysics, becomes naturalism with a platonic ideal dimension, just as, according to Santayana, egotism, when transformed into a metaphysics, becomes transcendental idealism.[11]

To the person who stays within the tradition, the rebel, whether in art, philosophy, religion or politics, is always a disinherited person. As Santayana explicitly remarks, in his essay on Shelley, "the misfortune of all revolutionists is that they are disinherited and their folly is that they wish to be disinherited even more than they are."[12] Of course the obvious and in some way unanswerable retort of the revolutionists is that all inheritance is not necessarily a good, since as the Bible intimates, one may inherit a curse quite as readily as a blessing. But such a retort would have absolutely no meaning for Santayana. His total lack of sympathy or appreciation for the rebel's point of view is, in a way, one of his greatest shortcomings and accounts for much of his unruffled confidence and the hints of smugness in his tone. All rebellion he can see only as being intrinsically an act of suicide, intellectual and moral. And the success of revolutions, as he remarks in another connection, "is generally proportionate to their power of adaptation and to the reabsorption within them of what they have rebelled against."[13] The romanticist in art, the protestant in religion, the revolutionist in politics, the transcendentalist or mystic in philosophy, are all different species of rebel, all of them instances of what Santayana chooses to call egotism. And the essence of egotism is that

[11] It should be noted that "piety" is here not defined in precisely the same way as Santayana defines the term in III, Ch. X. Santayana himself, it may be mentioned in passing, is not quite consistent or, at least not quite clear about his own definition (see II, Ch. VIII). The object in this paper is not to take one of Santayana's own concepts and interpret his whole philosophy in terms of *that* concept. It is as much a fortuitous coincidence as in the nature of the case it could be, that the key to Santayana's philosophy proposed in this paper is also a concept that Santayana has actually *defined*.

[12] *Winds of Doctrine*, p. 156.

[13] III, 83.

it is "subjectivity in thought and willfulness in morals," [14] both of them cardinal sins.

Santayana's position, extreme though it may be, still has its philosophical justifications. There is no recognition, to be sure, of the enthusiasm, divine perhaps, that there is in men to go out and remake the world more in accordance with the demands of the spirit. This lack of recognition is due in large measure to Santayana's very inadequate notion of the nature of the ills that beset mankind. They assume for him, as for Joan Durbeyfield in Hardy's poignantly optimistic novel, "a metaphysical impalpability sinking to mere cerebral phenomena for quiet contemplation, and no longer stand as pressing concretions which chafe body and soul." [15] But granting all this to be true, Santayana is nevertheless quite right, to a certain extent, in maintaining that the reformer in any field is too intensely anxious about reform. The ideal values do not suffer corruption, nor need they nor can they be improved by a mere change in the matter that supports them. And he who is content to be a mind will live in the light of the ideal, and will not worry overmuch about specious reform. This habit of living in the mind Santayana most strikingly exhibits in his *Soliloquies in England*. He is not at all interested in reforming the Englishman, for example; and as he is today the Englishman affords a poetic and philosophic mind many a valuable theme. True, Santayana idealizes his subject, as who does not! But as we allow others to rhapsodize about mathematics or God or love, so we ought to allow Santayana to choose as the objects of his rhapsody the human institutions, events and historical people he loves to contemplate, recognizing his musings for what they are, not condemning him, as some have done, as a visionary because we happen to be blind.

[14] *Egotism in German Philosophy*, p. 6.
[15] *Tess of the D'Urbervilles*, p. 20.

If we accept as a principle of interpretation Santayana's piety, many of Santayana's attitudes which are otherwise puzzling become clear and also consistent. If the essence of rational living is piety, then the essence of all ideals is to give meaning and moment to one's tradition. The ideal has true ideality when it is the ideal of something and is beyond experience. The egotist has learned only half the lesson of life, has learned that the ideal is a vision, a goal, but not that it has its natural source and human reference. The romantic poet or transcendental philosopher, when they have set up vague fancies and all manner of frenzied fiction, set up, it is true, objects of effort that can never be reached; but these mad illusions bear reference only to their madness; whereas the true ideal furnishes an objective and purpose to the stream of experience in which we actually live. The artist is, to be sure, a dreamer, but, as Santayana succinctly puts it, "he is a dreamer consenting to dream of the actual world." Art for art's sake is a perversion and trivial. Art to be significant must be expressive of actual life. One can almost hear the voices of Ruskin and Carlyle in Santayana's denunciations of the merely artistic for its own irrelevant sake. He upholds a criterion of art that is almost ethical. "Expression is never art while it remains expressive to no purpose." [16] Arts "become nobler and more rational as their utility is rendered spontaneous or their spontaneity beneficent." [17] Indeed, Santayana would seem to go even so far as to say that poetry is an indulgence of adolescence, for he says "maturity brings love of practical truth," so that "fiction becomes less interesting than affairs and poetry turns into a sort of whimper." [18] Santayana does not mean, however, that art is to be productive or useful in life. Nothing could be further from his thought. Art is a good in itself, its

[16] IV, 36.
[17] IV, 37.
[18] IV, 101-102.

value is intrinsic and is its own justification. Its human source and reference are only conditions of its significance, of its being worthy of serious attention.

This is true of art, but it is equally true of all thought. Thought has its natural source, but to be worthy of the name it must also have an ultimate beneficial human value. Indeed, so strongly and insistently does Santayana stress this quality of thought, his phraseology has a sharp flavor of at least popular pragmatism or the medicinal interpretation of philosophy—the three great branches of universal medicine being theology, philosophy and law, the medicines respectively for man's celestial, worldly and social ills. For example, in the Introduction to the *Life of Reason,* Santayana writes that "man's rational life consists in those moments in which reflection not only occurs but proves efficacious."[19] Or, much more emphatically, further on in the same volume, he says, "speculative reason if not also practical is not reason at all."[20] And still, despite such utterances, and the fact that he was heralded as a new advent to the pragmatic ranks, Santayana vigorously repudiates any such imputation It is a matter of doubt whether Santayana is quite consistent in his notions about the nature of thought's efficacy. But his position, if not consistent, is nevertheless quite clear. Since thought is epiphenomenal, in the nature of the case it cannot have any causal power in any vital sense of the word cause.

If thought cannot be efficacious, the practical reference of the ideal, or thought, is not of the nature of a test of its ability to function in our experience, as is, roughly, the pragmatic test. It is rather exclusively a means of determining the significance of the ideal; whether, in other words, it expresses natural forces and pertinent conditions in experience and not dreams and illusions. It is a means of determining whether the reason the ideal expresses is

[19] I. 2.
[20] I. 176.

willful and egotistic or docile and pious. The value of the ideal lies in the meaning it gives to existence, and its meaning is an ideal value in itself.

There remains one other element in Santayana's thought to be noted; i. e., his humanism in morals and his hatred of all expressions of the agonized conscience, namely Puritanism or Calvinism and Roycean idealism, which is the philosophy of puritanism. Roycean idealism is, in Santayana's opinion, a fanatical and immoral philosophy. It both justifies the existence of evil and makes impossible a knowledge of the good. If everything finally becomes good, or rather, if everything really is good at the present moment although we don't happen to see through the evil disguise the good has assumed, whatever we do is indifferently moral and justified. If our ears are not attuned to the subtler and diviner harmony we are necessarily involuntary musicians in the cosmic orchestra. To be able to act at all morally it is necessary to be voluntary agents, and in order to be such we would have to come into some sort of communication with the Absolute, possibly by consulting or becoming one of its priests. In the world as we have it there is, as a matter of fact, a generous mixture of evil and good, vice and virtue, stupidity and brilliance. This, which is so evident, only those who have a metaphysics or a God to defend would ever think of denying. Santayana is quite contemptuous of those who let their philosophical or religious sympathies blind them so miserably. And that arch instrument of apologetics—the Absolute—makes Santayana change from measured irony to passionate denunciation. The dominant kind of argument of the Absolutist is that just as danger is a necessary condition of courage, darkness of light, poverty and crime of charity and justice and love, so, generally, evil is of good. But the virtues that form the basis of this a fortiori argument are not virtues at all for Santayana. At best they are

only "barbarous" [21] impure virtues, or, as St. Augustine would say, "splendid vices." These virtues are expedients of a desperate need; they have only necessity to justify their existence. And to necessity we only bow; it is to ideality, or harmony that we worship. The end of life is the ultimate harmonization of the totality that life constitutes. No method can be justified which ruthlessly excludes any impulse from its proper place in the total harmony, thereby condemning it to extinction; and this is just what Puritanism does. Neither is any method justified which disregards the patent facts of existence and by logical subtlety and ingenuity tries to make the "really" good out of the "apparently" evil; and this is just what Roycean idealism does. The only *moral* morality is the morality that takes the conditions of life as they actually are and tries to mould the conflicting purposes and forces into an ideal harmony. Complete harmonization would be complete rationality or ideality: something we can only approximate but never obtain. The task, however, is none the less defined. The reasonable life is thus unmistakably a sort of microcosmic manifestation of the *Life of Reason;* it is the ideal expression of irrational impulses, the progressive rationalization (in the pre-Freudian sense) of the irrational basis of human life. This relativistic ethics, with its vision of an immaterial harmony, of a perfect concord, breeds a generous sympathy and tolerance in the soul. It is not, however, a tolerance that indiscriminately tolerates whatever comes along. That kind of tolerance is either an expression of extreme skepticism or else it is a sign of spiritual disintegration. It is absolutely necessary for our emancipation from moral dogmatism and fanaticism that we recognize the arbitrary and irrational character of our fundamental position; but it is even more imperative for our moral life

[21] *Character and Opinion in the United States.* The Essay on Royce.

that we stand fixed in our preferences, in order that we may scan the horizons without losing our bearings.

The doctrines that we find in Santayana are not presented in well-articulated arguments. They come more in the form of casual observation, obiter dicta, comments upon phenomena that have attracted his eye. Philosophy for him is decidedly no scientific pursuit. It is not an analysis as much as an appreciation, an evaluation of life. The preoccupation of some philosophers with traditional "problems" strikes Santayana as being a little odd and more than a little sad. He sees "one-half of the learned world is amused in tinkering obsolete armour, as Don Quixote did his helmet," [22] and he cannot refrain from smiling, for they are only playing at being philosophers. The true philosopher's task is nobler; he contemplates the vast ocean of being and muses upon the career and destiny of the tiny "eddies" that form on its surface and are called men. He is the spectator of the gay and tragic pageant of life as it unfolds itself through history in all its glory and pomp and glitter. And his philosophy is a commentary upon what he has seen of life, and a report of the visions of ideal essences he has had. He lives a life apart, free from all ordinary cares and occupations. Even with his fellowmen, he has only occasional converse, for he must be silent, as Santayana says, "for long seasons; for he is watching stars that move slowly, and in courses that it is possible though difficult to foresee; and he is crushing all things in his heart as in a wine-press, until his life and their secret flow out together." [23]

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[22] I, p. 9.
[23] *Character and Opinion in the United States*, p. 37.

IMPERFECT CORRELATIONS BETWEEN THE PHYSICAL AND THE VITAL[1]

SO FAR as we know, no one has hitherto treated the questions at issue between materialism and vitalism by the method of concomitant variations. This we propose to do in the present paper, by comparing various biological, mental and social processes with the concomitant physicochemical processes. The outcome, we may say at the outset, is not favorable to the materialistic views on these questions.

We shall first compare variations in organic structure with variations in the associated physicochemical processes.

One fact which seems to us very significant is the persistence of organic structure with but little change generation after generation, and in some cases for entire geological epochs, while the particular chemicals and energies associated with that structure are constantly changing. We are not prepared to assess the precise significance of this fact, but there is certainly an incomplete correspondence between the variations of organic structure and the configurations of matter and energy combined with it. The structure is highly stable, while the individual configurations of matter and energy associated therewith persist for only brief periods of time. Individuals die and the individual configurations of matter and energy undergo dissolution, while the structure, the species, persists.

[1] This paper is adapted from a chapter in a forthcoming book entitled, *The Organization of Matter*, which proposes a new theory of primary factors in vital phenomena and, more specifically, in human experience.

UMI

Again, the structures evolve, giving rise to differentiated races or species, while the chemical compounds and forms of energy associated with structure do not evolve, or at least do not evolve at the same rate or in the same direction. Says Henderson: "The underlying physicochemical processes in living organisms seem to have remained about the same throughout the whole process of evolution. So far as it is possible to form any opinion on the matter, this conclusion is inevitable. . . .

"With very trivial exceptions, the economy of life on earth is now and probably always has been founded upon the synthesis of carbohydrates from water and carbonic acid with the accompanying fixation of energy, followed by the conversion of carbohydrates into fats, proteins and a great variety of other related substances. Later there is an oxidation of these substances back to water and carbon dioxide, accompanied by the utilization of the energy in various forms of organic activity. Correlated with this is the fact that cells are made up of water, carbonic acid, carbohydrates, fats, proteins, and certain other substances. They are enough alike in chemical composition and in physicochemical structure fully to justify the concept of protoplasm as a fairly constant physicochemical apparatus throughout the organic world. . . .

"Thus while the evolutionary process has certainly produced a large number of well-defined series of changes when it is looked at from the morphological point of view, it still remains very probable that such physicochemical changes as have occurred are not only of a secondary nature, but that they are much less of the character of serial modifications. Indeed, one is tempted to say that in a physicochemical sense, the variations are distributed in rather a random manner, without any particular indication of a general progressive tendency, such as we seem obliged to think of in studying morphological variation.

"No doubt the evolutionary process has, from time to time, invented new chemical substances and greatly modified colloidal systems. In the total these changes are very numerous and of the utmost importance to the student of evolution. But *progressive* change is more particularly a morphological phenomenon and it seems to be almost self-evident that progressive morphological evolution should not be accompanied by the same degree of continuous variation in straight lines in physicochemical properties. Such a parallelism would, I think be well nigh unaccountable. However that may be, there is no evidence for it." [2]

This comparison could be indefinitely elaborated, but the detailed results thereof would exhibit much the same character. Just as the typical physicochemical processes underlying vital activity do not vary with the associated morphological phenomena, considered from a phylogenetic point of view, so they do not vary with the same phenomena, considered from an ontogenetic point of view. There is no evidence that the physicochemical processes of the individual organism vary in the same way as do its bodily structures and functions, and there is an enormous amount of evidence to the contrary. While there is some degree of positive correlation between series of changes falling within the two categories, as in the development of secondary sexual characteristics, such correlation is not very high relative to the scope and nature of the changes in question. Moreover, organisms of the same species all have their individualities, comparable in a way with the morphological and functional characteristics of species and other taxonomic groups; but conclusive evidence is wanting that the physicochemical processes of individual organisms differ so extensively as do their structures and functions.[3]

[2] Henderson, L. J., "Orthogenesis from the Standpoint of the Biochemist," *Am. Nat.*, Vol. LVI, 1922, pp. 99, 101.

[3] The same observation would apply to different organs and tissues of the same organism, and to corresponding organs and tissues of different organisms.

While each species and even each individual may differ from all other species or individuals psysicochemically—and there is some evidence that this is the case[4]— these differences are not in the specific chemical compounds entering into the body (excepting minor differences between species), but in their several *systems* of physicochemical interactions, together, of course, with the resultant end products. There is clearly no correlation between the number of distinct biochemical compounds and the number of species or of individual organisms which have appeared in the world.

Let us observe that two different types of imperfect correlations between bodily structures and the associated physicochemical processes are here exhibited. (1) There is an all but complete lack of correlation between those structures—whether of species or of individual organisms—and the *typical* physicochemical processes associated therewith. (2) There is also an incomplete correlation between those structures (with the corresponding functions), and the *particular* chemical compounds and energies associated therewith. Stated otherwise, there is a relatively high degree of independence or indifference between organic structures and functions, on the one hand, and (1) *types* of physicochemical processes, and (2) *numerically identical* physicochemical processes, on the other hand. The type of structure and function is obviously not dependent on the type of physicochemical processes associated with it; and the individuality of structure and function is not dependent on the individualities of the chemicals and energies associated with it. So far as the criterion of concomitant variations supplies a test of physicochemical hypotheses, therefore, these hypotheses are proven to be untenable. Such measure of correlation as can be demonstrated between the two series does not seriously affect this conclusion, as these

[4] Summarized by Ritter, W. E., *The Unity of the Organism*, Vol. I, Chap. IV.

correlations cover at most but a small and relatively insignificant portion of the facts to be accounted for.

A special case of the independence between individualities of structure and function, on the one hand, and individualities of associated chemicals and energies, on the other hand, is supplied by a comparison of the variations of individual chemicals and energies combined in the brain and nervous system, with the variations of memories, habits and other mental functions associated with those chemicals and energies. There is a ceaseless interchange of chemicals and energies between the living body and its physicochemical environment, and it is fairly certain that numerically identical chemicals and energies do not remain permanently in tissues which undergo waste and repair, as do nervous and all other tissues.

A series of experiments by Shiro Tashiro[5] have shown that oxidative metabolism in the brain and nervous system is more intense than in other tissues of the body, and, therefore, that certain substances therein are broken down and displaced with greater frequency than are corresponding substances in other tissues. There is some evidence, however, that the protein compounds in the brain and nervous system are broken down and displaced at a slower rate than are the proteins in other tissues. It has been estimated on the basis of experimental data that if the decomposition of proteins in the tissues were equally distributed, such proteins would be renewed once in five years.[6] There is no basis for an exact estimate of the rate by which protein decomposition in the tissues of the brain and nervous system occurs, but we can assume a much lower rate of protein decomposition therein, and still have a basis for some significant comparisons.[7]

[5] *A Chemical Sign of Life*, pp. 29ff., 36.

[6] Mathews, A. P., *Physiological Chemistry*, p. 800.

[7] The analysis here has special reference to the proteins of the brain and nervous system because these are presumably the more stable compounds therein. Mathews has suggested that memory hormones are produced and retained in

Now, as we know, many memories persist from childhood through adult life, and there is evidence that habits and other acquired mental functions also persist for considerable periods of time—longer, in all probability, than the time requisite to a complete displacement of the chemicals and energies combined in the brain and nervous system at the time such functions were acquired. Bourdon, a French psychologist, acquired various habit functions and tested their retention after short intervals of time, and again after seven or eight years had elapsed, without practice of those functions in the interim. It was found that such functions as the translation of a certain number of German words into French, or naming a certain number of parts of speech, were retained for seven or eight years without practice, and with comparatively little loss of efficiency.[8] Moreover, there is no doubt that certain types of habits, such as swimming, for example, persist from the time of acquisition through adult life. They are quite as persistent as are many memories acquired during childhood. So far as we know, no exact tests have been made of the retention of sentiments or other acquired complexes of affective elements in our experience, so that the variations in this group of mental functions cannot here be compared with variations in the concomitant physicochemical processes. However, comparisons of memory and habit functions with the associated physicochemical processes can be made fairly decisive, so far as the method of concomitant variations is capable of yielding decisive results.

This comparison leaves no doubt as to the results, though the meaning thereof may be open to debate. Memory and habit functions often persist, with comparatively little loss

the nerve cells (*op. cit.*, p. 587). While this suggestion is an interesting one, there is no experimental evidence which supports it, and it is impossible to conceive the synthesis of such hormones from the enormously complex physicochemical processes associated with the acquisition of particular memories.

[8] Bourdon, B., "Recherches sur l'habitude," *Année Psychologique*, Vol. VIII, 1902, pp. 327-340; summarized by Thorndike, E. L., *The Psychology of Learning*, pp. 318-320.

of efficiency, for long periods of time after the numerically identical chemicals and energies associated with their acquisition have been displaced, and, in some cases, for periods of time during which the numerically identical chemicals and energies of the brain and nervous system have been displaced over and over again.

Three possible rebuttals are open to the physicochemicalists. First, they may challenge the validity of our assumptions respecting the time rate with which proteins in the brain and nervous system are displaced, and others substituted for them. But this line of attack would avail but little, even if it succeeded in rendering those assumptions questionable. For it would have to be shown, in addition, that the brain and nervous system are not subject to the processes of waste and repair characteristic of other living tissues. Such a hypothesis involves consequences so far reaching that, should it be established, the fundamental conceptions of physiology would have to be radically reconstructed.

Even the establishment of that hypothesis would not serve to rebut the conclusion supported by our analysis. For it would have been demonstrated at the same time that the proteins combined in the brain and nervous system are chemically inert, so that the active functions associated therewith would have to be ascribed to electrical phenomena, if the mechanistic theory of those functions were to be retained. But an interpretation of those functions in terms of electricity would involve entirely new conceptions of electricity and of energy in general. For one thing, we should have to picture the nervous system as a group of storage batteries endowed with the faculty of renewing themselves, in order to maintain their functional efficiency. Furthermore, precisely the same electrical energies would have to be retained, if the persistence of memory and habit functions were to be accounted for. But any such assump-

tions are, of course, insupportable. The only demonstrable source of the electrical energy found in nervous and other living tissues is the chemical changes in those tissues. And electrical phenomena associated with nervous function involve the transformation of electrical into other forms of energy, since it is an axiom of physics that energetical phenomena of any sort involve the transformation of at least a portion of the energy present into one or more unlike forms of energy. It is beyond doubt, therefore, (1) that the source of the electrical energy in nervous tissues is chemical action in those tissues, and (2) that the electrical energy, however derived, does not persist in the way required to account for the persistence of memory and habit functions.

We may observe, incidentally, that these considerations effectually dispose of that particularistic form of the physicochemical hypothesis which identifies consciousness with potential energy. Any potential energy there may be in the brain and nervous system must be associated with the chemicals combined therein, and must therefore be displaced with the same rate of frequency as are the chemicals themselves. It could not serve, therefore, to account for the persistence of habit and memory functions. If the rebuttal above suggested should be undertaken by physicochemicalists of this school, we should find ourselves reduced in the end to invoking chemical action as the source of the energy in the brain and nervous system, whereupon the same consequences would follow. Moreover, the potential energy postulated by this hypothesis must do its work through its transformation into active energy of some sort, and no warrant is offered us that such active energy would be transformed back into potential energy in such a way as to assure the persistence of memory and habit functions. But even if this latter possibility be granted, the fact remains that chemical action is the source of the energies at

work in nervous tissue, and such action involves the displacement of the chemicals combined therein, together with the consequences we have deduced from this fact.

A second sort of rebuttal open to physicochemicalists would be to argue that, though the chemicals and energies combined in the brain and nervous system are constantly being replaced by other chemicals and energies, the structure of the system and of its component neurons remains substantially the same. It might be contended that memories and habits are identified with those structures and the corresponding functions, and need not be dependent on the particular chemicals and energies associated with those structures and functions. This is the type of rebuttal which presumably would be undertaken by physicochemicalists of the organismic school.

Such a rebuttal can, we believe, be effectually demolished. The structure and functions appealed to cannot have, on any physicochemical hypothesis, an existence apart from the chemicals and energies associated therewith, but would be the interrelations or systems of interactions between such chemicals and energies. When those chemicals and energies are displaced, therefore, the given structure and functions will be displaced at the same rate, though replaced by structural and functional elements of similar kinds. The point is that the structure and functions associated with numerically identical chemicals and energies will not themselves be numerically identical with the structure and functions associated with numerically different chemicals and energies, though similar to the latter. But such numerical identity is requisite, on this hypothesis, to a positive correlation of neural structure and functions with memory and habit functions, since the latter *are* numerically identical. Physicochemicalists cannot appeal to such a numerical identity of neural structure and functions, consistently with their hypothesis.

A third sort of rebuttal would be to claim that the proteins and energies remaining in the brain and nervous system while the processes of waste and repair are taking place somehow impress the memories and habits stored up in them on the newly-formed proteins and energies which replace the old, so that memories and habits suffer loss, and undergo repair, day by day, in somewhat the same way as do the nervous tissues themselves. On this hypothesis, the old proteins might be said to educate the new ones in the functions to be subserved by them all.

Granting for the moment that such a process is conceivable, let us see what the hypothesis involves. The given memories and habits could not be identified with particular chemicals or energies, for memories and habits do not disappear and reappear in the same way as do the broken down and newly-formed proteins of the nervous system. Moreover, we know on other grounds that memories and habits are correlated with a large number of individual neurons, and hence with large numbers of proteins and the associated energies. What we should have, then, would be large numbers of proteins coöperating in the education or discipline of each newly-formed protein so that it should serve effectively the specialized function of its predecessor. For ourselves, we can form no conception of how this might be done. It is certain that any such process would be radically unlike anything we know of physical and chemical action. Until the physicochemicalists show us, therefore, how it might be done, we are not justified in entertaining the hypothesis that it can be done.

Moreover, this hypothetical process, whatever it might be, would imply that the given habits and memories are constantly being destroyed and recreated anew, and by a process and at a time rate totally dissimilar to the process and rate whereby they are established in the first instance. How would such a process square with the uniformitarian

principle so stressed by mechanistic hypotheses? Should we waive this question, and admit that two series of processes so dissimilar might have the same outcome, we should still have to postulate, it seems to us, some sort of pre-established harmony between the two series, or a *deus ex machina* capable of making them turn out just the same. This means, in the last analysis, that the correspondences between numerically identical memory and habit functions, on the one hand, and numerically identical physicochemical processes of the brain and nervous system, on the other hand, exhibit such a low degree of correlation that no monistic physicochemical interpretation of those functions is tenable.[9]

One could compare, by the method of concomitant variations, the various types of mental processes with their associated physicochemical processes (regarded as types, not as numerically identical), and while a degree of correlation could always be established between the two series—since experience is always correlated with the nervous system and with environmental stimuli—the *degree* of correlation would in no case be such as to lend any support to the physicochemical interpretation of mental processes. For the latter never imitate the models set by masses and their motions, and mental development never completely parallels the development of the brain and nervous system.

The divergences between mental and nervous developments have been so well set forth in a standard treatise on physiological psychology that we can do no better, in considering this topic, than quote from it at some length. "In spite of certain striking correspondences between the evolution of the bodily organism and the development of the

[9] Bergson, in his *Matter and Memory*, has maintained the same thesis as ourselves respecting memory, but interprets habit in mechanistic terms. His argument is supported by a mass of evidence drawn from nerve physiology and abnormal psychology. See Chap. II of the work cited, and especially pp. 151ff.

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mental powers, it must be held that there are marked divergences as well. At certain epochs of life the evolution of the brain seems to stand far in advance of the mind; at others, the mind appears to have overtaken and passed by the stage reached by its physical substratum. During a long period of life the growth of mental powers is constant and solid, while the growth of the physical basis has nearly ceased, and such changes as are taking place in it appear quite inadequate to serve as correlates for the mental growth. Moreover, the most distinctly typical features in the development of the mind remain the same when malformation or disease or accident have largely changed the physical evolution of the brain. . . .

"Long before the child is born it possesses a wonderfully elaborate nervous mechanism, far surpassing in its grade of evolution the nervous system of the most intelligent adult animals. Previous to birth this nervous mechanism must also be constantly in action in a highly complicated way; it is engaged in supervising the processes of nutrition, and in the reflex and automatic activities which are expressed by the changes of the child's position within the womb of the mother. The mind, however, is as yet unawakened. . . . The mental life cannot then be said to have kept pace before birth with the evolution of the brain, or with its distinctive activities. On the contrary, it is far behind the stage already reached by its physical support. *It waits to be aroused* and set to its own work of combining and interpreting those sensations which are to serve as its chief means of early culture. . . .

"Within a few months after birth the child has undergone an enormous mental development; it has become a mind, in some inchoate way recognizing itself as the subject of states, and perceiving a surrounding world of objects of sense. It has also begun to attend to the objects

presented in consciousness, and to direct its attention by voluntary choice. The mind's relating activity has been aroused; and acts of memory, discrimination, and judgment, as the basis for those concepts which require articulate language to express them, are repeatedly taking place. And soon, the assumptions of reason, as involved in all human experience of things, and of their action and reaction upon each other, are found to be shaping the growth of the mental powers.

"As accompanying and forming the ground for this sudden blossoming of the mind in the use of its conscious powers, there is a continuous and yet diminishing monthly increase of the substance of the brain. No new organs are formed within the cranial cavity; but those which have been formed previous to birth are further developed under the changed conditions of nutrition. In respect to the quantity and arrangement of its molecules, the nervous mechanism certainly undergoes no development during the first year of the child's life which at all corresponds to, or accounts for, the development of the child's mind. . . .

"The formation of so-called 'dynamical associations' among the molecules of the nervous mass furnishes no adequate account of the development of mind. This development is not in the direction *simply* of associating together states of feeling, each one of which has an exact physical correlate in a physical association among the minute parts of the nervous substance. It is rather a development which for its very existence requires something different from such associations. The child might go on forever merely associating together affections of its own mind in correspondence to dynamical associations among the nervous molecules, and yet have no growth of experience such as it actually attains. . . . So far as we really *know* anything about the development of both brain and mind, we are compelled to say that the latter, when once started by the sen-

sations furnished through excitation of the former, proceeds to unfold its activities with a rapidity and in an order for which no adequate physical causes can be assigned." [10]

After pointing out similar divergences in nervous and mental developments throughout the life of the individual, Messrs. Ladd and Woodworth show that the effects on mental functions, of lesions in the brain of man, or the extirpation of brain substance in animals, do not favor a theory which completely identifies nervous and mental functions; and that, on the other hand, there may be serious interruptions of mental development without any adequate cause thereof in cerebral developments being discoverable. They demonstrate further that not one of the higher mental functions, "so far as its *sui generis* character is concerned, admits of being correlated with, or represented under, any of the conceivable modes of the motion and relation of molecules of nervous substance." [11]

For present purposes, but little is called for in the way of comment on the incomplete correspondences between nervous and mental developments just detailed. The main facts are scarcely open to dispute; only their significance for our problem could furnish an occasion for disagreement. Respecting the latter we may at least say that the low degree of correlation between the two series seems incompatible with any type of materialistic interpretation of mental functions. The burden of proof is clearly on those who maintain, in the face of these facts, that a materialistic interpretation is feasible. A point which should not be lost sight of is that mental processes and the concomitant physicochemical processes conform to patterns differing so radically that no way of representing either series in terms of the other can be imagined. Our main contention, therefore, that the degree of correlation between nervous and mental functions is of such an order that the latter cannot

[10] Ladd and Woodworth, *Elements of Physiological Psychology*, pp. 657-661.
[11] *Ibid.*, pp. 661-664.

be reduced to terms of the former seems to be fully justified.

Some further elaborations of the topic may, however, be presented before taking our leave of it. These will be set forth with a minimum of comment, for the facts themselves will speak rather eloquently against the hypothesis we are here considering.

No perception would be recognized as having any relation, either of identity or of causal connection, from simply comparing it, with the nervous processes and the environmental stimuli which we know, on other grounds, are associated with it. Any visual percept, to ignore the concepts and meanings that enter into it, denotes an object of a certain size and shape, covered with masses of color, light and shade, whereas the nervous processes and environmental stimuli involved in this percept must be represented in terms of an infinitely larger number but infinitely smaller bodies, to which sensible qualities are also imputed, but which have little in common with the percept itself.[12] Moreover, sensory qualities arising from the nerve processes set up by the inpinging stimuli are organized in a manner to which there is no parallel in the system of interactions of the masses involved.

The processes involved in judgment, the development of concepts, the analysis of propositions, etc., have no conceivable parallels in the physicochemical processes concomitant therewith. There is nothing discoverable in brain functions which is at all similar to the formulation of a law or principle, the classification of individuals into species and genera, or the discrimination of sensory qualities. We cannot identify or conceive any brain equivalents of the abstraction of homogenuous qualities, whether pertaining to material bodies, as blueness, hardness, bitterness, etc., or to the relationships between members of a social group, as honesty, justice, responsibility and the like. Should we

[12] Cf. Pillsbury, W. B., *The Essentials of Psychology*, p. 46.

attempt to picture such mental processes in terms of masses and their motions, we should have to think of them as the telescoping, fusion and interpenetration of material bodies; as the occupancy of the same space by different bodies; as an infinitely complex system of selective attractions and repulsions between bodies; as interactions between mere aspects of material bodies. The brain correlates of mental processes cannot be imagined to behave in any such ways as these.

As a final item in the comparison of the mental and the physical we may take the time references of physical actions and mental functions, respectively. Masses and their motions, whether or not they have their locus in the brain and nervous system, exist or occur only in the present. They know nothing of the changing seasons, of a coming eclipse, of recurring sunsets, or even of the next moment. But the human organism acts most of the time with reference to anticipated future events. It lays in coal for the winter, plans its vacation for the coming summer, prepares a lecture for the next day, orders groceries for the midday meal, makes arrangements for a year of travel abroad. It acts with reference to time yet to be, and to places more or less distant from that where the organism happens to be at the moment. While its actions are in the present, they face the future and help to make that future —and the more or less distant future at that—what it will turn out to be. Anticipated events in the future partially determine the order and organization of our present activity, though they do not contribute any energy to that activity. The future shapes our present activity, in part, because we have learned from experience that it fulfills many of the promises it holds out to us. We find that the groceries ordered for dinner do often provide a palatable and digestible meal, that we do generally deliver our lectures according to schedule, that our vacations do some-

times justify our hopes of them, and so on. Moreover, the human organism investigates the past. It does so, of course, by dealing with records of various sorts existing in the present, but yet it acts with reference to a past time, attempting to discover the nature and order of the events that actually occurred in the past. But the temporal references of masses and their motions are all of present time, not of future or past time. While the past motions of masses will have determined their present positions, their present behavior is not retrospective, as is so much of the human organism's behavior.

And the spatial references of masses and their motions having a significance for the organism and its behavior are of the positions in space actually occupied by those masses. Although changes in the positions and motions of those masses may often be calculated, they nevertheless do not at the given moment act with reference to their future positions and motions. The calculation of those future positions and motions is not made by the masses themselves, but by organisms which are more than masses and their motions, and which can, to a certain extent, calculate future events.

The masses and motions combined in the brain and nervous system cannot account, therefore, for the past and future time references or the remote space references of the human organism's behavior. The mental processes to which those references must be ascribed cannot therefore be completely correlated with the associated physicochemical processes of the brain and nervous system, or of the body as a whole.

We may say, in conclusion, that all the types of mental functions here passed in review are imperfectly correlated with the concomitant physicochemical processes, and that the correlation subsisting between the two series is of such an order that the physicochemical series cannot be regarded

as determinative, in any exclusive sense, of the mental series.

We come now to a body of facts which are of the greatest significance in human life, but which have figured but little in biological thought. We refer to the products of human thought and action in the past—to culture in the broadest sense of the term, including language, customs, dietaries, industrial and fine arts, political and economic institutions, religious creeds and philosophical systems, and even scientific knowledge itself.

We do not need to insist on the importance of these cultural factors in human life. They determine a large part of the difference between primitive and modern societies, between any two societies, in fact, which are separated in time or space. The causative efficacy of these cultural elements is beyond question. We only have to consider the differences in the physical and social environments of, say, an Indian village and a European metropolis to grasp at once the causal role played by this group of factors. More particularly, they are a most important group of factors in the arrangement of bodies in space, as the example of the Indian village and the European metropolis clearly demonstrates.

Their influence on the fortunes of the human species, viewed biologically, is equally profound and far-reaching. Through them the substances taken into the body, particularly food substances, have been greatly changed in character. They have also profoundly modified the adjustments of the human organism to temperature, rainfall and other climatic conditions. They have virtually revolutionized the conditions of survival for the human species. The factors determining survival and extinction of racial stocks are now profoundly different from what they were ten thousand, or one thousand, years ago. Great inequalities in the incidence of these factors, or conditions, have been estab-

lished as a result of the same cultural influences. Consider, for example, the effects of the present system of wealth distribution, the celibacy of priests and nuns, the humanitarian care of physical and mental defectives, standards of living in relation to the birth rate, and so on.

The effect of these factors on *individual* behavior is equally significant. Habit has been called second nature, and that is not too strong a term for the role of habit in individual behavior. Yet most habits of the individual are derived from the cultural factors by which he is conditioned. Cultural factors of the social group become habits in the individual, and indeed play their part only by being thus translated into individual action. It is true that all these factors are to be referred, for their ultimate explanation, to hereditary characters of the organism, but the cultural factors themselves are largely independent of individual human organisms, although dependent on the latter for their influence. We have in these cultural factors a group of independent variables, so to speak, which are of coördinate importance in human life—whether regarded biologically or otherwise—with the hereditary traits of the organism and with the physical environment—two other groups of independent variables with which the first group is always associated. Proof of the independent variability of these groups of factors is supplied by the fact that any human organism could develop in any physical environment and under any complex of cultural factors which are adapted to the human species generally. There would of course be temporal and other restrictions on this possibility, but these do not diminish the significance of the general statement.

It is clear that biological theory must adjust itself to this group of factors, and that any theory of life which is to withstand criticism must supply an interpretation of these factors which does justice to the biological role which they

indubitably play. Culture or tradition plays a smaller part in the life of other animal species, although evidence is not wanting that it plays a role of considerable importance among a number of the lower species. The undoubted fact, however, that it plays a role of the greatest importance both in the arrangement of material bodies on the earth's surface and in the evolutionary history of at least one animal species proves that it has a significance for biology and for science in general which is not to be overlooked.

Let us see whether physicochemical hypotheses can square themselves with this body of facts. Cultural elements have their origin in the past thought and action of human individuals, some of them still living, but most of them long dead. Thought is the most significant phase of this process, and it will simplify the problem to limit our consideration to the role which thought plays in this situation.

We may call the matter and energy involved in thinking the material substratum of thought, and this without attempting here to pass upon the nature of the factor or factors involved in thought processes. Now, it cannot be denied that innumerable thought processes, or at least the products thereof, are potent in human life and evolution, biologically regarded, long after the material substrata of those thought processes have disintegrated. The thoughts of Socrates, of Gallileo, of Newton, not to mention the thoughts of those unknown individuals who discovered how to kindle fire and to domesticate animals, have been potent in human life and evolution for centuries since the configurations of matter and energy constituting the material substrata of those thoughts underwent dissolution. Whatever theory one may accept regarding the relation of thought to matter, it is obvious that the matter and energy associated with those thought processes have not continued to produce the same thoughts, even though some of that

matter and energy may have gone into the brains of other thinkers who have reproduced, through learning processes, those same thoughts, or reacted to them in other ways.

Yet the thoughts of those thinkers live on and many of them, for anything we can see to the contrary, are immortal. There seems thus to be a high degree of independence between thought and its material substratum. Certainly the thoughts themselves, as distinguished from their material substrata, have exerted an enormous influence on human life and evolution, and even, as we have seen, on the inorganic world. The thoughts of Plato, Aristotle, Galileo, Newton, Helmholtz, Darwin and other thinkers, the combination and interaction of which have produced modern science and placed it at the service of mankind, exert a causative role out of all proportion to any which could be claimed for the configurations of matter and energy associated with the mental processes of these thinkers.

There is no possibility, on the showing made thus far, of equating the two groups of factors considered in respect to the causal roles which they play in both the organic and the inorganic worlds. Not only do the thoughts play causal roles out of all proportion to any which could be assigned their material substrata, but the thoughts play a causal role for incomparably longer periods of time. For if there is no break in the cultural history in which any given thought or system of thoughts finds its place, that thought or that system *never* loses its causative efficacy, even though, as normally happens, it is continually modified and taken up into new thought syntheses.

Moreover, particular thoughts commonly, if not always, play their causative roles *after* the material processes associated with them have been terminated. For the communication of a useable thought—the first step whereby it approaches social and biological efficaciousness—must, in the nature of the case, come after the physicochemical proc-

esses associated with the origination of the thought are completed. And the major influence exerted by useful thoughts generally comes after the death of those who originated those thoughts, and therefore after the material substrata of those thoughts have suffered dissolution. We may conclude, therefore, that no strict correlation, either in the form of a psychophysical parallelism or otherwise, can be established between thought and physicochemical processes in the brain, when these are regarded as causative agencies.

Some plausible objections might be urged against this line of reasoning. It might be objected, in the first place, that the social or biological effects of a given thought will depend on the number of persons (or nervous systems) to whom (or which) it is communicated, and on other material agencies with which the thought becomes associated (as in the industrial applications of a chemical discovery, for example). In other words, a thought is causally effective only and in proportion as it becomes associated with material factors.

These claims are true, but they scarcely touch the validity of the previous argument. For, first, the thought itself is the primary causal factor. It is effective only as it is assimilated by the brains of human beings, but it *is* the *thought* which is assimilated, and the *directive or organizatory* influence of the thought which modifies behavior, or determines the order of material changes in the environment. The thought was on the scene first, if we may so speak. The thoughts of Plato, Galileo or Newton were active in the world long before any person now living was born in the world. The thought is therefore the first member of the causal series in which it is operative.

Secondly, it is the thoughts of Plato, Galileo, etc., in the most literal sense of the term which are active. Later actors on the human stage *learn* these thoughts, and they may cor-

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rect and modify them; and the thoughts are effective at any given time only as they are learned and translated into action. But the thoughts existed prior to the learning and utilization thereof, and cannot be subordinated, causally, to the brain processes involved in the learning and utilization. We seem justified in affirming, therefore, that the thoughts of past thinkers in a most literal sense of the term continue to play a causal role in the world today. The thoughts for all we can see *become* quite independent of the thinkers themselves and of the material substrata of the thinkers' mental processes.

It may be objected, also, that thoughts are communicated by material symbols, that there is a material concomitant to every process in the origination, communication and utilization of thought, and that it is the material factors involved which are real and efficacious in a causal sense, and not what we are pleased to call thoughts. It might be claimed that causal series in which thoughts find a place could be traced back to the thinkers that originated and communicated these thoughts, and that every member of such causal series has its associated material processes which give that member of the series its causal value. We do not imagine that this objection and this claim will seem very plausible except to those who have resolved once for all to think of every reality in terms of matter and energy. But it will be well, if possible, to expose the absurdity of such an interpretation of the facts in the case.

It should suffice to point out that the brain processes involved in thinking could not possibly be transmitted to other organisms. And the masses and their motions in a transmitting medium, whereby thought *is* communicated, are of a totally different character from the brain processes involved in the thinking, although both fall, broadly speaking, within the general category of bodies and their movements. The given thoughts must be identified, on the

physicochemical hypothesis, with one or the other of these systems of interactions, or with them both. The acceptance of any one of these alternatives by the physicochemicalist leads to impossible consequences. But they are the only alternatives open to him. On his assumptions, either (1) thought is wholly identified with brain processes, in which case it cannot be communicated; or (2) it is wholly identified with the masses and motions involved in the communication of thought, in which case the brain has nothing to do with it; or (3) it is identified, indifferently, with the brain processes or with the masses and motions involved in communication, in which case the same thoughts are, at different times, and even at the same time (the time of communication), wholly different things, or aspects or epiphenomena of wholly different things; or (4) thought is identified both with the brain processes, and with the masses and motions involved in its communication, in which case thinking cannot occur without its communication. Moreover, by any one of the last three alternatives, a single thought could be a thousand different things at the same time, since its nature could be a function of any system of symbols employed in its communication. Additional comment seems unnecessary. Obviously thought cannot be exclusively a function either of the brain processes involved therein, or of the symbols employed in its communication, or of the brain processes and symbols combined.

The argument from the diversity of the symbols employed in the communication of thought may be put in a different form. As has already been intimated, thought is *indifferent* to the symbols employed in its communication, provided an adequate *medium* or *instrument* of communication is supplied. Any language may be employed, the communication may be oral or written, the stimuli employed may be auditory, visual or even tactual. It could scarcely be maintained, therefore, that air waves, light

vibrations or pressure stimuli employed in the communication of thought are significant members of the causal series into which thought apparently enters.

If one maintains so extravagant a proposition, he must admit that an indefinite number of material factors (air waves, light vibrations and tactual stimuli employed in the diverse systems of communication in every developed language) may produce the same effects. These systems of symbols might theoretically be infinite in number, and no two of them alike, if we consider the differentiated tonal qualities of oral communications by different speakers, the distinctive characteristics of individual calligraphies, the diverse combinations of typographical style, different qualities of print paper, etc. Now, we could scarcely maintain, on accepted logical principles, that it is the factor or groups of factors which need never be the same in a causal series where the effect is always the same that is responsible for the effect, and that it is the factor which is always the same that has nothing to do with the effect. If that be so, we shall have to revise all our conceptions of cause and effect, give up indeed our postulate of law or of causal series in nature, and admit that science is impossible.

The fact that the same idea or thought is not always followed by the same effect does not affect this argument. The given thought or idea will always produce the same effect, providing all other conditions (not counting the symbols employed) are the same.

The most superficial introspection will convince anyone of the truth of this contention. When we are reading Plato's *Dialogues,* or Newton's *Principia,* for example, we are dealing, not with the symbols whereby their thought is communicated—that is if we are an adept in using the system of symbols employed—we are grappling with the ***thoughts*** of Plato or of Newton in the most literal sense of the term. The same analysis applies to any oral or writ-

ten communication, although we may be interested in the style or other incidental features of communications to which we are attentive. Thought is as indifferent to its symbols as a liquid is to its container, and it would be as reasonable to claim that a glass bottle containing hydrochloric acid, for example, is to be credited with the properties and potencies of that chemical as to claim that the air waves, light vibrations, etc., whereby thought is communicated are to be credited with the properties and potencies which thought seems to possess.

This indifference of thought to its symbols is emphasized, and at the same time accounted for, by the fact that meanings are assigned to symbols by convention, so that the symbols will mean anything which the given language group may agree that they shall mean. Hence, given different language groups, the diversity of the symbols employed for the same meanings naturally follows. We may observe, incidentally, that masses and their motions, such as processes in the brain, or certain sorts of black marks on white paper, do not choose, by convention or otherwise, to associate themselves together in any way they please, and in infinitely diverse ways at that. The arbitrary ascription of meanings to symbols must be attributed, not to brain processes or to masses and their motions in a communicating medium, but to thought processes associated with those several processes.

We may say that, for any given system of symbols, the thoughts to be expresed determine the selection and the order of the symbols employed, and are not determined by the latter. The thought to be expressed determines the particular symbols to be employed for any and all systems of symbols. The absurdity of any proposition that the symbols are the factors back of changes apparently produced by thought could be at once exposed by pointing out that this proposition implies that the symbols employed in ex-

pressing the thoughts of Jesus or Socrates in the French language or in Esperanto, for example, are to be credited with the effects produced on one by a French or Esperanto translation of the sayings of Jesus or Socrates, when neither language had been evolved when Jesus and Socrates lived. The thoughts of Jesus and Socrates were on the scene before the French or Esperanto (or any other modern) system of symbols was evolved, and it would be absurd to subordinate, causally, the thoughts of Jesus or Socrates to symbols which have arisen since those thoughts were first uttered. The thoughts are primary, in the causal sense, and the symbols are only instrumental.

We may add, as another item in the comparison of thought processes with the associated symbols and brain processes, that the historical development of the two series exhibits at the most, but very incomplete parallels. The thought processes issue in myth and dogma, art and literature, science and philosophy, ideals and traditions, all undergoing cumulative growth or development; while brains and nervous systems have been of much the same sort throughout this history. Nor have the systems of symbols serving as vehicles for the communication of these thought-products changed in the same ways as have the thought-products themselves. A scientific discovery or the composition of an opera, for example, does not necessarily involve the invention of a new symbol. New symbols are of course invented in connection with creative intellectual activity, but the communication of the results of any such intellectual activity is for the most part by means of pre-existing symbols. And, to repeat a previous point, the results of the given intellectual activity is for the most part by means of preexisting symbols. And, to repeat a previous point, the results of the given intellectual activity determine the choice and arrangement of the symbols employed in their communication. The symbols are not determinative of the

intellectual activity, for the letters and words of a given language do not themselves produce poetry or other thought creations in that language.

Nor is the development of science, philosophy or literature correlated in any strict sense with the growth of the human species in numbers. There may be a vigorous intellectual activity in a comparatively small social group, and but little original intellectual activity in a populous social group. Knowledge is not destroyed in the same sense as human organisms are. Knowledge goes on growing day after day, and generation after generation, whereas human organisms die and are succeeded by other organisms of the same species. The process of cultural continuity in human society is altogether different from the process of biological continuity underlying human society. Owing to this difference, the per capita amount of scientific knowledge in the world today, if we may put the matter that way, is greater than it was a generation ago, and very much greater than it was a thousand years ago.

As a final item in the comparison, we may point out that matter and energy do not increase in amount, whereas knowledge does. Matter and energy are conserved, but knowledge is cumulative. Thought is creative, for it is constantly adding to knowledge; but matter and energy are not creative, since they do not produce anything new. The latter may be combined into new aggregates, but they do not add to the amounts of matter and energy in the universe. Thought does add to the amount of knowledge.

A similar analysis could be worked out for other aspects of cultural evolution. Customs, institutions, arts, traditions and other cultural factors are to be interpreted as modes of behavior and of sentiment as well as modes of thought. Since modes of thought originating in the past are essential elements of all such cultural factors, none of them could be interpreted exclusively in terms of physi-

cochemical processes. Moreover, when regarded from the standpoint of the bodily movements or types of sentiment partially determined by, or constitutive of, those cultural factors, these latter could not be interpreted in terms of physicochemical processes alone. The complex system of bodily movements partially determined by, and constitutive of, our Federal Constitution, for example, could scarcely be accounted for in terms of the chemical reactions, or the masses and their motions, involved in this complex of movements. The transmission of the cultural factors constitutive of the Federal Constitution could not be regarded, from this point of view, as a transmission of numerically identical bodies and energies, but rather of complex *modes* of motion which may be correlated indifferently with any bodies and energies of certain specific *sorts* combined in certain specific *ways*—the sorts and combinations peculiar to human organisms capable of entering into our constitutional system. The mechanical motions of masses involved in this system could not determine the transmission of *modes* of motion of this sort. Physics and chemistry have no concepts under which any such modes of motion could be subsumed.

Sentiments likewise are inexplicable on any physicochemical theory of the human organism and its experience. Even granting that the specific types of feeling and emotion combining to produce sentiments current in a given social group could be interpreted in physicochemical terms, it would be these specific affective elements that were transmitted by physicochemical processes, and not the complex sentiments into which they are developed in the given social environment. For the latter are developed in the individual through learning, imitation, and other assimilative processes, similar in a general way to modes of thought and behavior already considered, and, like them, inexplicable in terms of the correlative physicochemical processes.

Cognitive or thought processes are really the significant feature of all these cultural factors, including their origination, transmission, assimilation and continuous modification, and these cognitive processes largely account for the complex modes of feeling and behavior partially constituting those factors. Human behavior is so widely differentiated from the behavior of other animal species, because human beings are capable of enormously more complex types of thought than other animals, and this serves both to make the behavior of the human organism, when abstracted from its cultural background, widely different from that of other animals, and to make possible the communication to and assimilation by other organisms, of modes of behavior initiated in the first instance by types of thought peculiar to the human species. The development of the sentiments parallels the development of thought and behavior, whether regarded from the standpoint of the individual or of the social group; and the significant factor in this process is the type of thought peculiar to our species and differentiating it, all along the line, from other animal species. This analysis by no means implies that instinctive impulses and the affective experiences associated therewith are not potent in human behavior. On the contrary, they are of coordinate importance with the cognitive processes themselves, and indeed largely determine the objects or situations with which the latter are concerned, and to which the cultural factors made possible by those cognitive processes have reference.

Summing up, we may say that the only thing proved by the correlation which subsists between material and cultural factors is that the latter are interdependent, and in all their manifestations, with material factors. Material processes do not wholly account for thought or other cultural factors, and their causal efficacy, as our analysis has demonstrated. And if material processes do not account for

cultural factors and their causal efficacy, they do not wholly account for the human organism and its properties, since those factors play an important role in human life and evolution, biologically regarded. We have here not only a case of incomplete correspondence between physicochemical processes in the organism, and organismic processes in their entirety, but also a most important group of factors in the life of one animal species which cannot possibly be equated with physicochemical factors. It is difficult to see how the physicochemical theory of life can maintain itself when squarely confronted with this body of facts.

It would be interesting to consider the ontological status of these cultural factors, especially ideas transmitted by the past, but such a consideration lies somewhat beyond the range of our inquiry. Perhaps the simplest conception would be to regard ideas transmitted to us from the past as communications of all the thinkers who contributed to the development of those ideas. This would mean that those thinkers had achieved a species of immortality, and continued to live and work in the world long after their bodies suffered dissolution. Or it is possible to suppose that their ideas become wholly dissociated from their personalities, intellectually regarded, and lead a semi-independent career of their own. Ideas long submerged and unknown to any human beings living during that period may be later brought to light through the discovery of written records in which they are embodied, and thus made potent in human events once more. Ideas thus seem susceptible of a process analogous to canning or cold storage, when they may be wholly dissociated from any human beings, living or dead, but yet just as available for use, when discovered, as are material things preserved in anticipation of future need. The cold storage process is of course widely used in all types of intellectual activity today. It is not so important, for our purposes, to decide between these

alternatives, as to point out the dissimilarity of the processes whereby bodies and their motions, on the one hand, and thought and other cultural factors, on the other hand, are transmitted from one period of time to another. The genesis, transmission and assimilation of ideas or other cultural factors are substantially different processes either from the movements of bodies in space, or from the reproduction, development, and succession of living organisms concerned in the genesis, transmission and assimilation of those cultural factors. The two alternative hypotheses respecting the ontological status of the latter will serve to emphasize this contrast.

We have completed our comparison, by the method of concomitant variations, between vital, mental and social processes, on the one hand, and the associated physico-chemical processes, on the other hand. We have found that the correlations between the two series are in no case of such an order as to lend any support to the hypothesis that factors in either series are wholly determinative of factors in the corelative series; and that, in some cases, the coefficient of correlation, to speak metaphorically, is so low as to demonstrate the presence and operation, in those cases, of two or more groups of independent variables.

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HUMAN NATURE

THE first and most perplexing difficulty encountered in writing this paper was the jumble of words that presented themselves for use. Many talk glibly about things which men have named without in the least comprehending the essence of the things themselves, or even knowing whether or not they really exist. A word that cannot be defined by reference to a possible experience is void of meaning, for a mental fact cannot be communicated. All attempts to convey an abstract notion by means of analogies fall short of accomplishment because no two persons have the same experiences or respond alike to common ones. A philosopher reaching the limit of his facts, strives to convey his inferences to others, but he is compelled to use words that have as many connotations as have been formed by the varied experiences of those to whom they are addressed; thus the conceptions of men have been tangled up by words.

Scientists occupy themselves in segregating the component parts of material forms to each of which they attach a name, with further appelations to signify the manner in which they act and react upon each other. The cultured seize upon these words and use them as substitutes for the things themselves without comprehending the reality that lies behind them. Many a so-called learned treatise is worthless and misleading through such parrot-like use of words.

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Biologists, physiologists, psychologists dissect the human composition, differentiate its various elements, infer the reactions between them, coin words to represent their convictions and write treatises about them until it seems that the names themselves were all that mattered. Their students, fixing in their neural processes these abstract words imagine that they have reached the summit of knowledge and go through life with the words on the tips of their tongues ready to let them fly at those whose conceptions were formed by attending to explicit experiences rather than by absorption of scientific nomenclature. Scholastics revel in words to exhibit their erudition and succeed not only in misleading others, but in befooling themselves. They imagine that they settle matters by using words which are reflected into their consciousnesses by confused and poorly equipped neural activity, when they are but adding to the difficulty of comprehension.

The ordinary individual uses the words, instinct, intuition, emotion, imagination, memory, will, attention, intellect, mind, thinking, ego, soul, spirit, etc., as though the word was the ultimate thing. No attempt is made to get behind the word to realize the essence behind it. There is a blissful ignorance that the significance of such words is different to each person.

Hence the difficulty of avoiding the Charybdis of scientific terms and the Scylla of equivocal words.

Nothing can be truly known until there is a clear comprehension of the simple, irresolvable elements which constitutes the matter under consideration, so in this matter of HUMAN NATURE it is needful to apprehend its fundamental elements.

The first fundamental element, principle, or impulse is the URGE TO MANIFEST, that irresistible force which is behind all action in nature. Nothing exists that does not manifest its inner nature; the gaseous, mineral, vegetable,

and animal forms have this inner force that compels them to act according to their natures. It is a universal and omnipresent factor in the universe. This fact forces the inference that the urge to manifest existed before the universe itself and may have been the cause of its creation; in short, that it is an attribute of the Supreme Essence. This inner force finds expression in the human being, and is reflected in the urge to live to the fullest extent, to extend the scope and possibilities of existence, to satisfy all needs and desires. It may well be that this urge is the essence of that which is variously termed the ego, the I, the spirit, or the soul of man. It is, at all events, the mainspring of all action, it is the pulse, the universal nisus of nature. Denied an outlet, this urge becomes unbearable; pent up it becomes too great to be contained, and, like the electric force in the clouds, burst forth in ways that have disastrous effects.

Disclosure of the inner nature of man cannot be successfully prevented. However much a man may seek to hide his real nature from his fellow men by studious cultivation of misleading acts and expressions, yet, in little things, in unguarded moments, in crises, in companionships where he feels free to let himself go, his nature stands out stark and clear.

The second fundamental principle is that of persistence, the indestructibility of matter and energy, of which Herbert Spencer adduced so many proofs. As this is also omnipresent in the universe, the inference is that it too abides in the Supreme Essence.

Every material form, every species, persist so long as environmental conditions permit. Even under unfavorable conditions the tendency is to endure although hemmed in, hampered, and prevented from giving expression to all of the inner forces. When all expression is denied the form inevitably perishes.

It may not be a fruitless speculation, just here, to consider how these two fundamental principles may have worked to produce life. Whence came and what is life have been the riddles of the ages. Speculations as to the origin of life and of its introduction upon the earth have occupied great scholars throughout the centuries; much has been written and many experiments have been made in the endeavor to solve this mystery without reaching any general agreement. The explanation of this failure may be that the solution is too simple to be apprehended by wonder loving and superstitious minds. To say that life is an impulse, an attribute of the Supreme Essences is as meaningless as the word life itself. The best that can be done is to apprehend the effects that we find life to produce, and as the astronomers discovered planets that could not be seen, as the chemists discovered elements that could not be segregated, as electricians made themselves familiar with the laws that govern electrical manifestations, so may the investigator discover the laws and operations of life and deduce therefrom the reason for and the object of existence.

If we find that the universe is permeated by the two fundamental elements, the urge to manifest and persistence, we can easily see how they might have worked to produce, from the plenum, the gases and the solids; that refinement which by attrition of contending forces and combination of elements made possible and produced a rudimentary nerve element that was sensitive to stimulation. Might not this be the beginning of life, for what is life, after all, but a manifestation of these elements and a potentiality to respond to environment?

Progress in the sublimation of matter created the power to feel, which the urge to manifest and the element of persistence developed into the urge to procreate, to preserve the germ of life, causing the production of seed cells

in all living forms, whose nerve structure had become too complex to permit of a persistence of all its elements by simple division, which contain all the potentiality of the parent bodies. So irrepressible is this urge that billions of seeds are produced to each one that finds conditions favorable to development. It has been said that in this nature is prodigally wasteful, but as in nature "not a single grain is ever lost" there is no waste, the elements returning to the universal reservoir to be drawn upon for future needs.

Nor is this all; each cell produced carries something of the modifications, some of the increased sensitiveness, that the experience of its ancestors imposed upon it; progress was thus inevitable and involuntary, with the result that man appeared upon the scene. Successive increases in sensitiveness have transformed the original being, only slightly above the brute, to the present status of the highest type of human beings, a difference that seems to be one of kind rather than one of degree, a progress that enables man to control his environment to some extent while other animals remain helpless in that respect.

No one will be bold enough to claim that the Supreme Power has reached an ultimate in the evolvement of human beings as now constituted, and a further development may be looked for, the first step in which may be the development of sensitiveness to the extent that one psychic nature may be directly stimulated by the activity in another psychic nature without the uses of words or symbols so liable to misinterpretation. Such an advance is predicable upon the irrefutable evidences of telepathy and clairvoyance.

All changes in the environment, whether man made or not, have a profound effect upon the development of latent forces, they compel constant readjustments to conditions; as only those elements endure that are in harmony with the fundamental urges, progress is inevitable.

This evolution is not planned; it is a step-by-step process; guided by experience, by punishments that distinguish between rightness and wrongness. That is right which brings no punishment to the actor or to anything within his environment and, conversely, everything else is wrong. This criterion works in only one direction, but it is effectual in promoting those actions that synchronize with the underlying impulses that govern the universe.

The great sweep of the powers inherent in the universe makes the individual form of little or no account. Wholly immaterial are the reactions of any one individual except so far as his experiences tend to determine the rightness or wrongness of any actions, and to the extent that such results are made a part of the content of the general propagating cells. Only as human beings affect the trend of inheritance of the coming generations; only as their manifestations serve to create a closer harmony between the nerve elements and the fundamental impulses of the Supreme Essence, does their existence mean anything in the economy of nature.

Neural Processes

Before a clear pattern of the human constitution can be formed there must be an awareness of the different parts and of their interrelations. Anatomists, Biologists, Physiologists, have made clear the physical parts of the body, but it is only within the past twenty-five years that the psychic nature has been scientifically investigated. A brief outline of the discoveries in this field is necessary to a full understanding of human nature.

The sympathetic system was the first to be evolved; its nerve connections are with the smooth muscles which con-

trol the action of the glands, heart, brain, and the entire viscera; it has no connection with the stripped muscles which control the action of the sensitive parts of the body. The sympathetic system is not sensitive, that is, it has none of the nerve fibres that react to pressure or touch; it manifests in the form of feeling, the so-called emotions, such as hunger, satiation, fear, spunk, hate, love, dejection, elation, etc., the causes of which lie below the threshold of the consciousness.

The cerebro-spinal system, on the other hand, is plentifully supplied with nerve fibres that respond to the multitudinous streams of impressions from the outer world; their sensitiveness has been a matter of growth, and is capable of being enhanced through exercise and training. When a sense structure is stimulated, something analogous to a chemical process is set agoing which causes the impulse to pass along the conductors until it reaches its termini. Psychologists tell us that every such passage of an impulse describes an arc; arising at the periphery it passes to a center, either in the brain or in the spinal chord, and from thence back to the muscles, and they assure us that there is no stimulation that does not have its effect upon the muscles, further than this, "We must never lose sight of the fact that when a man reacts to even the most minute sensory stimulus, the whole body coöperates in the reaction, even if he only raises a finger or says the word "red." (Watson's *Psychology*, p. 48.) Pricked by a pin the disturbance sends its impulse along to its appropriate center, or centers, there arises an awareness, or consciousness, of this nerve activity, which completes its arc by reaching the muscles, and the entire body is affected. Such reactions fail to manifest themselves when the nervous system is intensely occupied with other impulses. Of this the following is an instance:

"Henry Clay, on one occasion, was unexpectedly called upon to answer an opponent who had addressed the senate on a question in which Clay was deeply interested. The latter was in poor health at the time and did not feel physically able to reply at length. However, as it seemed imperative that he should say something, he exacted a promise from a colleague, who sat behind him, to stop him at the end of ten minutes. At the expiration of the prescribed time, the friend gently pulled the tail of Mr. Clay's coat. As no attention was paid to the hint, it was repeated, a little more vigorously, after a short time. The eloquent senator still paid no attention, and the attempt was again made to remind him of his self-appointed time limit. Then a pin was brought into use; but Clay was by that time thoroughly aroused and pouring forth a torrent of eloquence. The pin was inserted deeper and deeper into the orator's leg without bringing any response, until his colleague gave up in despair. Finally, Mr. Clay happened to glance at the clock and saw that he had been speaking two hours, whereupon he fell back into his friend's arms, completely overcome by exhaustion, and upbraiding the friend in severe terms for not stopping him at the prescribed time."

Attention is a state, not a function. Let there be an activity in the neural-patterns and no one can avoid attending to the dominant note any more than he can avoid the influence of gravitation. Like gravitation also it is powerful in ratio to attractiveness. In the lighter play of the patterns in every-day life, a slight force, such as the calling of one's name, will overcome the inertia, but when the attractiveness is powerful, even the most vigorous efforts will be unable to pry away the attention.

Memory is not an impression, like the chiselled stone, or the indentations upon a phonographic record, it is not a resurrection of something that occurred in the past, but is an entirely new production. It is a consciousness of a pat-

tern that has been made to reform by some chance stimulation. There is in the nerves the same quality of persistence that is found everywhere else in the universe and a pattern once formed has the tendency to re-form upon the slightest provocation. But it is not exactly the same pattern, it contains some new elements and its decomposition is different; this difference may be so slight as to be immaterial or so gross as to distort its effects in the consciousness. A whiff of an odor may start a whole series of patterns, that have lain dormant during many years, and scenes of youth are resurrected, but a visit to those scenes makes one vividly aware of the changes that have crept into the patterns; it may be a dwarfing of distances, a difference in juxtaposition, or some such slight change, for in youth patterns are more firmly fixed and more exactly reproduced. Everyone has had the experience of reading again a long-time unopened book, to discover many changes in it, due to the new elements that are brought into play in its second reading.

Many times a truly honest person will relate an occurrence as a single experience when it is actually a combination of several similar events. The discrepancies in the testimony of several honest witnesses is thus explained; they each testify to that which arises in their consciousness from the patterns then in activity; they are not describing a past event, but giving their reactions to re-formations that are tinctured with other impressions.

The intensity of nerve action in the first instance creates paths that have the tendency to preserve the original form, being strong enough to repel all extraneous elements. The sympathetic system here seems to have an influence in befogging or clarifying the pattern. Those pattern that are accompanied by wonder, curiosity, or surprise, are apt to be the most enduring and the most easily re-formed.

The reality behind the word consciousness is the sensitiveness that enables the more highly organized animals to feel, to become aware of nerve activity when there is stimulation of the senses. In human beings there is a supersensitiveness that reacts to internal stimulation by the secretions, automatic action of the cells, and enables them to discriminate between forces that are striving to dominate the patterns. This awareness is not an inheritance, but a development through experience. The inheritance is the capacity for feeling, for sensing, and this varies greatly in degree between the lower animals and man, from coarsely to finely organized human beings. The infant's consciousness is rudimentary. It is only when the child develops patterns from the streams of impressions that flow in upon it, that it develops a real consciousness. The greater the experiences the more numerous and complex are the patterns, until, in the highest type of man, the content is so great as to require another element before there can be a clear consciousness of anything; this element is also omnipresent in the universe; it has been named "order." An element that brings related and progressive sequences, which allows the awareness to compare, combine, and to form abstractions, in other words, to think. As none of these effects are obtained without stimulation, and consequent activity in the nerve cells, possibly from the electrical discharge that accompanies nerve action, it is plain that there is an ever-passing panorama of present and past experiences thrown into the consciousness by the forming, re-forming, and passing away of patterns in the neural processes. Having the universal tendency to persist and frequently to re-form, the most powerful ingredients become fixed, creating what is termed conviction or "fixed idea." When a conviction has become firmly imbedded in the organism it is next to impossible to dislodge

it, for the elements of which it is composed repel the entrance of any antagonistic or modifying ingredients.

When a dominant note is powerful enough to occupy exclusively the neural activity there is that continued attention which is called concentration. During such concentration there is an inhibition of any awareness of other nerve disturbances. Serious physical disorder has often been unfelt when attention was commanded by a dominant pattern. Doctor Carpenter relates that he lectured at ease when a jagged calculus was tearing at his kidneys, the pain of which utterly prostrated him as soon as his consciousness was released from the attention demanded by his subject. Sir Walter Scott dictated some of his works in comfort while bodily ailment wracked his system. The phenomenon is of daily occurrence; many have had a jumping toothache cease when the emotion of fear took possession of them upon arrival at the dentist's office; one may have the acoustic nerves set in motion by the striking of a clock and be entirely unconscious of it, then, when the absorbing pattern subsides, there may be an echo of the sensation that creates a faint consciousness of the striking, often enabling one to count the strokes. Every one has had the experience of being unaware of current manifestations when intently absorbed in attending to the dominant activity in the brain. This is an important part of the working of the nerve processes and needs incorporation in the patterns if there is to be a clear impression of all phenomena, many of which are incomprehensible without it. A further personal illustration just occurred. While writing the above, the air in the room became colder and colder, indication of this, through my sense of feeling, was not strong enough to break in upon the pattern that was compelling my attention, until, coming to its conclusion, the pattern subsiding I suddenly became conscious of the feeling of chilliness.

Subconsciousness and intuition, about which so much nonsense has been written, here find simple explanation. The nerve cells are in constant activity, even when we are asleep, the impulses behind this activity are of different energies; only those having a certain degree of force or novelty find reflection in the consciousness or, in other words, are not strong enough to create an awareness of themselves. The degree of force requisite to create an awareness varies with each organism, and the acuteness of the sense organs is likewise affected.

When a path has become organized through repeated exercise, the impulse flows freely, little energy is required, and no consciousness is aroused; the impulse reaches the muscles unimpaired. Thus it is that so many things are done unconsciously; that skill is acquired, both in the muscles of touch and vocalization. It is thus that an individual becomes an adept in his vocation.

Women are said to be more intuitive than men, this may be because of a finer sensitiveness, and a less fixity in patterns, which permit of a slight awareness of the less dominant elements in the patterns, or a modification of the dominant pattern by unsensed elements. In all cases where the patterns have not become fixed these finer constituents manifest themselves, contend for place in the pattern, swinging it now in this direction, now in another; this contention reaches the consciousness and the individual is full of doubts, irresolution, and uncertainties.

If the operation of the nervous system is not governed by unvariable laws there can be no such thing as a science of psychology. Whether the foregoing description of consciousness is right or wrong, it represents the convictions of the writer. Convictions, according to this theory, are but recognition of dominant patterns, whether right or wrong, depending upon the composition of those patterns. An abundance of facts insures patterns rich in ingredients;

a paucity of facts and deficiency in experiences robs the patterns of the needful elements to form right convictions. The force of convictions, or the dogmatism of the individual is in direct ratio to the wealth of elements in his patterns; those lowest in the scale of culture having the strongest convictions. The highly endowed person finds it difficult to have convictions; so many elements conspire to send their reflection into the consciousness, that it is almost impossible to fix upon any one set pattern in the ever-changing conditions of existence. The term "WILL" is also misunderstood; it can be nothing more than the dominance of a fixed pattern that compels its possessor to react to it.

In the beginning an impoverishment of the body cells, through their activity, called for replenishment to enable them to satisfy the urges of manifestation and persistence, this they sucked from the surrounding tissue, the nerve fibres became extended until there arose a feeling, an embryo consciousness, of hunger and thirst; then experiences of dangers existing in the environment created the sensation of fear; that fear which has been the base of all religions, and a prime mover in animal activities. A fear that is as potent today as ever among all those whose patterns do not contain that recent and rare element which causes analysis of basic causes.

Somewhat in this manner arose the sympathetic system, which so largely controls the manifestations of human beings. As the spinal chord and the brain developed there came an increased sensitiveness and enhanced consciousness due to growth of the motor system and the development of the five senses in man, from the operation of which, through long eras of experience, he discovered and accounted for the universe about him.

Almost every part of the skin has nerve endings that are sensitive to touch or pressure; these end organs are con-

nected by fibres that lead back to a synapse, i. e., points of contact between cells, from whence they proceed along paths more or less susceptible to the impulse to a central cell or group of cells, which transmit the energy until the entire organism is affected in some degree. The passage of an impulse from one cell to another through the synapse is slowed up, but within a short distance regains its normal speed of about four hundred feet per second in the nerve trunk.

The writer has considered this extended introduction necessary as a background for an adequate understanding of his conception of human nature, which occupies the balance of this paper.

What Is Human Nature?

Strictly speaking, human nature is the qualities, characteristics, or constitution inherited from all preceding natures, supplemented by an element that adds to the sensitiveness, which enables the Supreme Essence to secure better manifestationss of the Supreme attributes. The term is often loosely applied to the manifestations that are frequently observed, in place of to its real meaning.

The human body is an electro-chemical organism, having a sympathetic and a cerebro-spinal system of nerves, which are acted upon by the urges of the indwelling Essence of the universe. The individual reaction to those urges is determined by the force and character of the ingredients inherited from the individual's ancestry according to the Mendelian law. Responses are never erratic, they follow with mathematical precision the laws of being; so that, given a knowledge of all the constituents and the conditions under which they are working an exact predic-

tion may be made as to the reaction. Even with our limited knowledge of the factors we are constantly making exact estimates of how a person will act. Knowing a persons' temperament, through long acquaintance, one can predict his attitude in certain situations. The wife and the husband soon learn how to bring favorable responses from each other, and what will induce or prevent unfavorable attitudes. Partners in business study each other and take care to avoid "treading on each other's toes."

When the constituents of the propagating cell lead to the development of a powerful cerebro-spinal system the individual will inhibit any excessive power in the sympathetic system; he will be stignatized as cold, hard-headed, practical, and selfish. When domination of the motor system is weak the sympathetic holds its control and the individual is said to be sentimental, soft, weak, and impracticable.

The chemical ingredients that the individual inherits from his ancestry determine his basic nature; within the propagating cell are the potentialities upon which the fundamental urges act. The degree of response depends upon the environment in which the individual exists, the training he receives, and the experiences through which he passes.

Man is not, therefore, a self-contained, self-actuated, self-created, or self-controlled organism; he is in large part the product of the social atmosphere into which he is thrown; the family life during infancy, his school life up to and through adolescence, his training for a vocation, the books that he reads, the companionships that he forms, the pictures that he sees, and the narrow or broad experiences that he encounters. All of these make indelible impressions upon his nervous systems and control his activities. The expression, "As a man thinketh so is he," is a putting of the cart before the horse, for the truth is that as a man is so will he think. Self-control is really self-

expression, the satisfying of the inner impulses in ways that are socially acceptable. There is in every one an internal conflict between the primal passions and social conventions, victory often going to the passions in persons whose concepts are not powerful enough to inhibit the action of the lower nature. Development of such concepts lies wholly in the cerebro-Spinal system.

As Professor Watson says: "It may be true from an evolutionary point of view that the cerebro-spinal system is an adjunct to the sympathetic, but the development of the former has reached such a point that it now is the 'tail that wags the dog.'" In other words, it is the latest, the most highly organized instrument evolved by omnipresent force in the universe through which to manifest the Supreme attributes.

That "You cannot change human nature" is true when it signifies that the basic urges remain the same, but given more perfect instrumentation they develop higher manifestations. That so little progress has been made since the advent of the first human being is but evidence of the slowness of advance that can be made through punishments, diffused as they are through the countless individuals in any species.

Boas says: "The differences between civilized and primitive man are in many cases more apparent than real . . . while in reality the traits of the mind are the same."

Buckle says: "We have no decisive ground for saying that the moral and intellectual faculties in man are likely to be greater in an infant born in the most civilized part of Europe than in the wildest part of a barbarous country."

Galton goes still further and maintains that the capacity for rationalization was greater in the days from five to three hundred years before the Christian era than it has since been. That the mental power of Aristotle, Aristophanes, Aeschylus, Aristedes, Aeschines, Cimon, Demetrius,

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Demosthenes, Euripides, Isocrates, Ictimus, Lysias, Militiades, Plato, Pericles, Phocion, Phidias, Polygenotus, Praxiteles, Socrates, Sophecles, Theophratus, Themissocles, Thucydides, and Xenophon was greater than that of any set of men to be found in the world today.

Differentiated from the animals by only a slight refinement in nerve composition, which gives greater sensitiveness to finer shades of differences in nerve activities, human beings do not seem to have acquired any additional capacity, their fundamental nature remains the same.

Reactions to stimuli are conditioned by the wealth or poverty of factors that lie submerged in the nerve fibrils which unite to form patterns, and by the facility of combination to which they have been exercised.

All that has happened is that from the experiences of individuals there has been acquired a greater knowledge of the processes of nature and of the laws which control them; the discovery of more facts which have worked to dispel from the modern concepts many of the fantastic notions of earlier times; an increase in the stock of abstractions that enables man to view life in a clearer light; but his original power to respond to the urge to manifest has not been increased.

Notwithstanding this fixity of the intrinsic power there has been constantly progressive improvement in manifestations.

"Not alone are heard the tumult
And the warring conflicts din;
For when fainter swells the clamor
Sweeter sounds are chiming in;
Kindness exorcising evil,
By her spell of potent power;
Love and truth mankind encircling,
With the bliss which is their dower."

With a higher, truer concept of the mission and obligations of human beings there would come higher and nobler manifestations. Man manifests his basic animal nature whenever it is not restrained or modified by his concepts.

This newer power of control is least stable, because of its being the latest development, because the concepts have not become strongly fixed, and because their content is being changed by rapid changes in conditions that the last century has seen. When stimulation of the more firmly fixed animal passions occurs savage reaction follows, either because the stimulation was too powerful to be inhibited, or because sufficient time was lacking for the operation of the more slowly formed concept patterns. Hence arises the admonition to pause and consider before resorting to animal retaliation.

No concepts have been so powerful, none have so controlled the lives of human beings, as those connected with religions. Based primarily upon the fundamental emotion of fear, they have ever been a hindrance to progress towards more enlightened conceptions; they have prevented the patterns from absorbing some of the finer elements with which the neurons have been inoculated by experiences in life. It is a part of human nature to seek a cause for every effect; in default of natural ones there has always been recourse to supernatural ones, and these, firmly established, become effectual blocks to the acquirement of any opposing truth. Due to the stupendous strides of science and inventions during the past fifty years, fixity of patterns is breaking down. When one dares not deny any assertion of further discoveries in the realms of nature, a denial of a better theory of philosophy is much more difficult than it was in earlier times. Civilization has so increased the complexity of life, that the slower process of forming fixed patterns cannot keep up with it, and each

generation is controlled by the generally accepted concepts of the preceding generation.

The unique composition of the chemical elements which compose each individual compels him to develop correlative characteristics, so far as the environment permits, and these characteristics are his nature, from which he cannot get away.

A person who conceives life to be merely for the pursuit of pleasure or for the indulgence of the emotions inherited from his animal progenitors will live upon the animal plane, but, by reason of his more sensitized neurons, he will display a tendency to evil manifestations to which the animal is immune.

A person who makes wealth the dominant note will suppress all the finer elements of his nature and descend to the depths of a miserly money-getter. One who focusses attention upon the obtaining and exercising of power over his fellow beings, strangles all those impulses which call for consideration for others, and prevents an acknowledgement of the co-partnership of all in the work of the Eternal Essence. One whose dominant impulse is that of self-esteem has no room for the formation of patterns that arouse the sentiments of love or self-sacrifice, for as Tolstoi has said: "So that a man who considers the reality of his relation to the universe to lie in obtaining the greatest welfare for himself—however much he may say he considers it moral to live for his family, for society, for humanity, or to do God's will—and however artfully he may pretend and deceive man, will always have as his real motive of action simply his individual welfare; so that, when a choice had to be made, he will not sacrifice his own personality for his family, state, nor to do the will of God, but will sacrifice them all for his own sake. Since he sees the meaning of life only in personal welfare, he cannot do otherwise until he alters his relation to the universe.

All living forms are compelled, under the universal law of manifestation, to seek expression of their dominant characteristics, and are unsatisfied to the extent that their manifestations are interfered with. The plant unable to find full expression withers and dies; the animal finding its environment repressive seeks a more congenial one, failing in that it also disappears; the human being, repressed by any means from expressing the inner nature, has the energy, released by the activity of the dominant characteristic, turned into other channels to create havoc in the nervous system, producing uneasiness, ill health, unhappiness, down-heartedness, insanity and self-destruction, when it does not lead to the arousing of evil propensities and criminal acts. Happy is he whose surroundings permit of full and free expression of his nature. For the only true satisfactions in life comes from harmonious relations with the forces of the Supreme Essence; the only happiness lies in free manifestation of the inner urges, for then, and then only, does man fit in with the current of the Infinite Power.

Sublimation in the brain cells, through which new concepts are formed, is an augury of a better synchronization with the "WILL OF GOD." But it is a distressingly slow process. Only a few persons in the world, possibly not one, are so void of conventional patterns (fixed ideas), as to be susceptible to the subtle elements that are needed to form new concepts. Take the case of reading. If the subject is familiar a conventional statement will cause no disturbance, on the other hand, it will be a source of pleasure, because it fits in with and strengthens a previously formed pattern. But if the wording stirs up submerged elements the reader will find difficulty in admitting them to the pattern already existing; he will either dismiss the whole matter or go searching, among his experiences, to find support for the struggling elements; this means effort and disturb-

ance which most people find disagreeable and to which they refuse to submit.

But it is by forming concepts that will turn the inner energy into right channels, into constructive instead of destructive forces, that future progress will be attained and humanity be brought into closer harmony with the Supreme Essence. It is through newer concepts that the animal patterns will be sublimated and be made more adapted to manifestation of the Supreme Attributes.

Let a man have the fixed concept that he exists to be one of the instruments of the Infinite, that he is an organism through which the fundamental forces are gaining experience and expression, and he could wittingly do no wrong, blunder as he might through ignorance.

This concept of service to God and man, which was the central teaching of the Man of Galilee, the very foundation of Christ's life; a concept that finds expression in lip service, without fundamentally affecting the life of the many; a concept that is now the basis upon which the now forming religion will rest.

The main tenet of that religion will be, that the mission and obligation of human beings is to become, and to insure that future generations become, the best possible instruments for expression or manifestation of the Attributes of the Supreme Essence of the Universe.

The philosophy of the future may be summed up in a simple statement that can be compressed into one short paragraph, possibly somewhat like the following:

A Supreme Essence, having certain imponderable attributes, and an energy that required forms for manifestation; to satisfy which there were evolved the gasses, liquids and solids as forms through which to manifest; those organized forms were improved by attrition and combination, until successive refinements brought the sensitive nerve and life into play, with its broadened possibilities for

experiences by which successive steps were determined, until the evolution produced human beings, as finer organisms to manifest the eternal attributes, and these are developing the next stage in the process of finding a more perfect manifestation, the process to continue until the PERFECT DAY.

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THE SACRED

SCIENTIFIC theology in the last decades has often trodden strange paths, especially in Germany. It sought to free religious feeling from the jurisprudence of outlived opinions and customs and to give religious life its place within the general intellectual culture of mankind. But often enough it went no further than collecting the phenomena of religious life, classifying and studying them in their historical connection. This scientific theology passed into psychology and history of religion, and in this field attained extraordinary success. But while it determined the variegated wealth of religious ideas and forms of expression it not infrequently arrived at a barren relativism and scepticism. It overlooked the fact that in the crudest conceptions of God held by primitive peoples, as in the most sublime hymns of great poets and in the deepest metaphysical thoughts of philosophy, there ultimately lives the same religious impulse; and, further, that this impulse, which may develop under the most different circumstances and unite itself with the most manifold strivings of man's soul, is in the end an independent concern of mankind, an *a-priori;* and, finally, that in our time it lost the consciousness that this impulse directed itself throughout the ages towards one and the same end, towards that eternally incomprehensible which lies hidden behind everything comprehensible, and which we experience only emotionally and grasp intuitively.

Awe is the first feeling which takes hold of primitive man towards this immense power; it appears to weigh us down, to subject, to extinguish us. Yet the impulse lives in us to give ourselves up to this potent power, and to embrace it with love. Everything sublime, everything worthy of reverence that we know, we see incorporated in this highest Being and enhanced to its limit. But while we endow "The Sacred" with the superlative of goodness, wisdom, justice, omnipotence, and love, there is at once the danger again that we rationalize a purely emotional experience, and thus lose its irrational root and eternal source. The great task of our time consists in giving its due place to the truly religious, and to see all its phenomena from the lowest to the highest as a unity, ever developing, and ever again veiling itself.

Prof. Rudolph Otto, of Marburg, one of the most prominent present-day German theologians, has taken a considerable step in this direction. Otto is a man of wide learning in philosophy, history, and the natural sciences, endowed with a keen critical faculty; but he is also a man of fine feeling, and full of reverence for all religious life in whatever forms it may appear. He is well acquainted with the newest results of ethnology and of comparative religion, and has convinced himself that nowadays the evolutionary theories of the materialistic age no longer suffice. The most recent investigation in the field of primitive religions, especially as represented by the Swedish writer Söderblom and the German Beth, has ascertained by an unprejudiced examination of extensive material that religion in its real sense is *no* corrupted magic, and cannot be derived from the belief in a soul or from ancestor-worship. Magic can be employed without any deeper stirring of the soul, in a purely practical way, based on primitive observations of nature; but it can also come into relation with the specifically religious; and the belief in souls already presupposes

a germ of "believing" behavior in the soul of the praying and worshiping man. This mysterious something, which lies at the root of the faith of primitive peoples, which they designate as Mana, Orenda, Wakonda, and so on, and which first of all arouses terror and demands blood sacrifices, ultimately becoming the symbol of everything sacred and worthy of adoration—this mysterious something Otto seeks to designate by a general name which excludes any confusion with analogous, related, and yet never interchangeable concepts. He derives this name from the Latin word *Numen,* and calls all specifically religious the *Numinose.* On the lowest grades of culture it expresses itself mostly irrationally; at a higher cultural stage it is to a large measure rationalized, and this may be called *The Sacred.* But religious life dies the moment the irrational factor is completely eliminated, where the religious experience is transformed into a pure concern of reason though accompanied by feelings.

In his excellent book about "Das Heilige,"[1] Otto took pains to give a comprehensive description and a penetrating analysis of these concepts. He took over the concept of "awe" from the ethnologists, and discusses Schleiermacher's famous definition of religion as the feeling of "absolute dependence." But he knows also that Jesus' "faith in the Father" and John's watchword "God is Love" belong also to this sphere. He shows that here is no case of different streams running parallel or occasionally crossing each other, but that in religious experience we are confronted with a highly complex phenomenon which displays itself in the course of history, expressing now this, now another side. Not primitive peoples alone make human sacrifices to their deity; the Old Testament also knows the "angry and zealous God," who threatens his chosen messenger, Moses, with death, and with whom Jacob must

[1] Published by Trewendte Garnier, Breslau.

wrestle at night in order to obtain His blessing. But Jesus also, in Gethsemane, struggles to the uttermost limit of physical and mental exhaustion with this intangible, which in spite of all love retains a characteristic of terror and even to the end remains a "Mysterium tremendum," an eternal mystery. To Luther also similar experiences were not unknown. He, who in his monk's cell broke down over his striving with a "gracious God," could assure us even later: "Yea, he is more terrible and grim than the Devil." He devours one, and takes such a pleasure in it that by his zeal and ire he is compelled to devour the wicked." It is not enough to forget, in the heartening and delightful aspects of religion, its terrible and stirring features; otherwise we are in danger of diluting religious experience and so rendering it insipid, just as pure rationalizing must lead to shallowness. Everything that has been connected with religion, humanity, the sublime, the tragic, devotion to nature, and so on, all these can by analogy elucidate one or other characteristic of that most complex structure, and at the same time may serve to weaken the religious spark slumbering in the breast of *every* man. But then the great question arises whether it will remain at a fleeting stirring of the heart or whether the whole life will be tuned to this key. The resolute turning to religion, the life in God, and from God, is a heroic venture, a leap into the eternally dark, into the immense, into the last depths of one's own breast.

The book of Otto is a tremendous confession of faith to this God, Whose nature no name expresses, Whom no formula contains and of Whom Goethe said: "The confession 'I believe in a God' is a beautiful praiseworthy expression, but to recognize a God, where and how He discloses Himself, that is a real beatitude on earth." Goethe also found the formula for that which Otto in his book tries to confirm by scientific means; when, in the "Marienbader

Elegie," is embodied the idea of the universality of the religious instinct and its deep-seatedness in the soul of man:

> The purity that in us lies
> With mighty surge spontaneous tries
> Itself in thankfulness to yield
> To ONE more pure, more high, Unknown;
> Developing till it has grown
> The ever Nameless clear reveal'd.
> We call this "Piety." [2]

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[2] "In unsers Busens Reine wogt ein Streben,
Sich einem Höhern, Reinern, Unbekannten
Aus Dankbarkeit freiwillig hinzugeben,
Enträtselnd sich dem ewig Ungenannten.
Wir heissens: Fromm sein."

BOOK REVIEWS

BENEDETTO CROCE AND MODERN ITALIAN HISTORIOGRAPHY. *Benedetto Croce: Storia della Storiografia Italiana nel secolo decimono. (Scritti di Storia letteraria e politica XV e XVI.)* Bari: Guis Laterza e figli, 1921. 2 vols.

Philosophers of history are not the best judges of historical writing. As a rule, they fit in only with theorizers of history, men who write about history but who do not themselves produce it. At best they can be classed among those historians who, through occasional philosophical-historical rationalizations, furnish themselves with the opportunity to link up history with their own speculations. The genuine historian is not to their liking. He marshals together facts which will not fit into any system, and, besides, too much spiritless labor is bound up with his trade.

The most brilliant exception to this rule is Benedetto Croce. Although no one is less disposed than he to consider a mere collection and erudite compilation of historical material as history, and although he draws the line between "chronicles" and genuine history more sharply than anyone else, he does not, on that account, cast any reflection on the value of erudition as such. Besides he brings to his task a preparation which is seldom to be found among historical philosophers. He has himself written history not only in the form of essays, but in the form of laboriously worked-out monographs. To the history of his own birthplace, Naples, he has devoted works which treat not only of the cultural, but of the political, growth of that city, and fulfill all the requirements of critical and scholarly research. He can therefore judge historical productions as an expert. And he is also aware of how much he owes to scholarly research. The writer of these lines well remembers how Croce once told him that anyone who had never written history should not discuss theoretical historical questions. The peculiar position in which the historian finds himself when face to face with disconnected historical material can be appreciated only by one who himself has tried to fashion an intelligible representation out of the sources.

In no other subject does this supposition prove to be more significant than in connection with the history of Italian historiography in the nineteenth century, for Italian historiography since the "Enlightenment" has few great names to offer. The ordinary historical philosopher would have found among all the writers who at that time wrote history only a few worthy of mention; the ordinary savant would have offered a meré catalogue in which presumably a few diligent compilers and editors would have found first place. Croce has adopted neither method. He makes a sharp distinction between learned productions and the understanding of historical events as dealt with in advanced treatises; but he allows both their place. All the material, moreover, has been classified with superior excellence and arranged in its historical continuity most nicely. No chapter heading contains a name; most of the titles are named after schools, some of which are alluded to only in a descriptive way; as for instance, "The Historical Writing of the Pure Historians (Nur-Historiker)," or "The Anachronistic School" (an attempt to revive the form of humanistic historiography in opposition to the rationalistic tendency of the Enlightenment). And however indefatigably Croce searches out the most insignificant names, critics and essayists of the 30's and 40's, he does not lose himself in the material or allow a detail to get the best of him. I confess that the patience which Croce has shown in reading through so many comprehensive compilations is beyond my understanding; even one who knows how methodically he distributes his time and how quickly he absorbs the contents of a book cannot fully appreciate this point in connection with his latest work. But there is something about it which is even more remarkable. Justus Möser reproached the German historians of

his time with collecting a vast mass of records and then writing compilations about them with untiring zeal. Croce surely has more just claim to unflagging enthusiasm than these old collectors, but his exposition conceals any such effort. The author he writes about may be uninteresting and often is, but he himself is never so. His style is always fresh. He has yielded less in this book than in his others to his exquisite taste for irony (as is well known, he can give to abstract discussions inimitable charm); but in spite of the serious tone of the present work, the Olympian light of his superior brain shines through it all. What may have contributed greatly to the rounding off of the material is the fact that the work in mention represents a second edition. "The History of Italian Historiography in the Nineteenth Century" first appeared by chapters in his magazine, *Critica*, during the years 1915-20; in this reprint Croce has curtailed a good deal and has considerably reduced sample works of forgotten historians. But this is only incidental. What lends life to the book is not its formal completeness, but the fact that behind it stands an impressive, thoroughly independent and judicious personality, and that the original character of this personality speaks in every word, if not in every syllable, of the book.

It is therefore unnecessary to emphasize the fact that Croce cleaves to no party, nor to any school. Of course, one senses that he is more sympathetic with the Guelfs than with the Ghibellines and that the positivist school leaves him unsatisfied. But his judgment is always so well balanced and finely shaded that one cannot accuse him of bias. On top of that he has the courage not to let his criticism halt at any celebrated name. Consider, for instance, his remarks about Pasquale Villari. It has been our habit not to examine too closely the estimable writer of two such conscientious and useful books as "Savonarola" and "Machiavelli," and to pass over in silence the defects of these works. Croce unblushingly tells the truth. He stresses the point that the philosophical element of the school to which Villari belonged was the "last gasp of dying thought," "the residuum of ancient sentimental and ethical customs." "Owing to his generalized, abstract morality, Villaro is not in a position to discuss an historical problem raised by a personality or an event." A "moral idea," to be sure, is found in all true thought." But Villari was not competent to discover this true morality in the life of a statesman like Lorenzo di Medici (how he shudders at the latter's immorality!), and he did not perceive that in the authentic or legendary anecdote which tells of Savonarola's confession on his death-bed, moral greatness lies not with the fanatical churchman, but with the politician, Lorenzo. If one reads critically Villari's book on Savonarola, one comes to the conclusion not only that the martyr was not the great man that his biography depicts him to be, but that this alleged forerunner of modernism was merely a left-over of the Middle Ages. The solution to the problem of Machiavelli is not furthered by Villari. For that task a "straight biography" like Villari's is not sufficient; it requires a dialectic conception of the relation between politics and morality and such a conception was closed to Villari, fettered as he was by a fixed dualism.

Croce has remarked in the preface to his "Historiography" that his book aims to furnish the youth of Italy who are students of history a method which, while in form consisting of an historical presentation, will be more effective as an actual abstract introduction to historical method. He has achieved his purpose brilliantly, all the more since his narrative is carried up to modern times (even Ferrero, who gets away with a bad rating, is mentioned). But it would be a pity if the work should serve such elementary aims only. Though there are sections in it which may not be palatable to the general public, especially outside of Italy, nevertheless, no one who is interested in the development of Italian culture in the nineteenth century can afford to overlook Croce's book. And whoever has been concerned with theoretical-historical problems will experience continuous pleasure in the nicety and sureness with which Croce applies his theories and judgments to his material even when he is dealing with the analysis of inferior works.

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(Translated by Arthur J. Nelson, Clark University.)